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INTERAFRICAN BUREAU
FOR ANIMAL RESOURCES**



Market Information Systems Audit on the State of Livestock Market Information Systems in Africa

FINAL REPORT

**Kingstone Mujeyi
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Prepared by: Kingstone Mujeyi

Edited by: Mrs. Patricia Mweene Lumba

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Requests for such permission should be addressed to:

The Director

African Union – Interafrican Bureau for Animal Resources (AU-IBAR)

Kenindia Business Park

Museum Hill, Westlands Road

P.O. Box 30786-00100,

Nairobi, KENYA

Email to: ibar.office@au-ibar.org

FOREWORD

Livestock offers huge opportunities to improve African rural people's livelihoods through its contribution to food security and income (Akash et al., 2021; Enahoro et al. 2019). The livestock value chains in Africa represent a potential multi-billion dollar business, which is yet to fully benefit pastoralists and other livestock producers living in rural areas (UNESCO 2012). However, changing climate, land degradation, land tenure issues, declining grazeable lands due to expansion in arable land and human settlements, and market access present some of the major challenges facing smallholder livestock producers across Africa today. The situation is worsened by the fact that the mirage of existing management information systems currently in place to service the information needs for various stakeholders in the livestock sector are disintegrated, lack sustainability models, and are beyond the reach of many. It has become imperative for an approach to be developed, which ensures that access to market information by the various actors, particularly the rural poor, women and youth is enhanced.

As a starting point towards this intervention, to the African Union's InterAfrica Bureau for Animal Resources (AU-IBAR) undertook a knowledge audit across the continent's livestock sector value chains to identify gaps in existing market information systems. This systems requirement study was undertaken between October 2021 and March 2022 through an extensive review of literature and secondary data as well as wider consultation of livestock experts and key informants across the African continent. The scoping study was conducted as an audit on the state of livestock market information systems (LMIS) on the African continent, with particular focus on the five regional economic communities (RECs). It examined information, infrastructure, skills and technology as well as other related services that make up the regional livestock market systems.

A key focus of AU-IBAR's strategic objective 5: Knowledge Management, Information, Communication and Advocacy, under the current strategic plan (2018- 2023) highlights the need to "improve the capacity for adaptive research in animal resources; acquisition, interpretation, documentation, sharing and utilisation of scientific knowledge and innovation to enable informed decision making."

Consequently, the expectation is that the findings of this study will open enquiry into and stimulate debate towards practical solutions aimed at strengthening Livestock Market Information Systems on the continent. Doing so will contribute to the effective implementation of the Livestock Development Strategy for Africa (LiDeSA) in the long-run.

Lastly, special gratitude goes to all stakeholders who participated and contributed towards the success of this study, especially the Regional Economic Community focal point persons, women and youth for their valuable feedback during the scoping study. I would also like to acknowledge the expertise of the consultant, Dr. Kingstone Mujeyi who prepared this work, and the technical team at AU-IBAR for the editorial work. Special thanks goes to the European Union for supporting this work under the Live2Africa Project.

Nick Nwankpa

Acting Director AU-IBAR



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ACRONYMS

AMIS	Agricultural Market Information System
AU	African Union
AU-IBAR	Union Inter-African Bureau for Animal Resources
CILSS	Comité Inter-états permanent de Lutte contre la Sécheresse au Sahel
CSIRO	Commonwealth Scientific and Industrial Research Organisation
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOAGRIS	Economic Commission for Agriculture Regional Information System
ECOWAS	Economic Commission for West African States
FANR	Food, Agriculture and Natural Resources
FAO	Food and Agriculture Organization of the United Nations
GL-CRSP	Global Livestock Collaborative Research Support Program
ICT	Information Communication Technology
ICPALD	IGAD Centre for Pastoral Areas and Livestock Development
IGAD	Inter-Governmental Authority on Development
ITU	International Telecommunication Union
KII	Key Informant Interviews
LD4D	Livestock Data for Decisions
LiDeSA	Livestock Development Strategy for Africa
LINKS	Livestock Information Network and Knowledge System
Live2Africa	Livestock for Livelihoods in Africa
LMICs	Low and middle-income countries
LMIS	Livestock Market Information System
LVC	Livestock Value Chain
MIS	Market Information Systems
MISTOWA	Market Information Systems and Traders Organizations in West Africa
MSD	Market Systems Development
NMIS	National Market Information Systems
PRINT	Promotion of Regional Integration
PPPs	Public Private Partnerships
RATIN	Regional Agricultural Trade Intelligence Network
R&D	Research and Development
RECs	Regional Economic Communities
RESIMAO	Réseau des systèmes d'information des marchés en Afrique de l'Ouest
RLMS	Remote Livestock Marketing System
SADC	Southern African Development Community
SEBI	Supporting Evidence-Based Interventions
SWOT	Strengths, Weaknesses, Opportunities and Threats

ToRs	Terms of References
UMA	Arab Maghred Union
VC	Value Chain
WAEMU	West African Economic and Monetary Union

EXECUTIVE SUMMARY

Through an extensive review of literature and secondary data as well as wider consultation of livestock experts and key informants across the African continent, this scoping study conducted an audit on the state of livestock market information systems (LMIS) on the continent, with particular focus on the five regional economic communities (RECs). The East African Community (EAC) has the upper hand when it comes to development and implementation of LMIS, with a number of state-administered and private-sector-led MIS initiatives aimed at enhancing accessibility of market information in near real-time. The EAC is followed by West Africa, which has a comprehensive MIS in the form of its ECOAGRIS (ECOWAS Agricultural Information System). The Economic Commission for Central African States (ECCAS) has the least developed LMIS, which is still fragmented, with market information scattered across state and non-state institutions. In North Africa, MISs are still the custodian of the state, with government ministries and departments playing a pronounced role in the generation and dissemination of market information. Although the Southern African Development Community (SADC) had developed a comprehensive Livestock Information Management System (LIMS) since 2009, implementation and scaling of the system has lost momentum due to limited funding.

The review conducted in this study has revealed that most agricultural market information systems (AMIS) initiated in Africa have suffered sustainability challenges due to financial instability that emanates from the ending or withdrawal of external donor funding. This heavy dependence on external sources for start-up financing has been criticized by experts for being a ‘form of vulnerability that have tended to affect sustainability of the LMIS’. For most of the public MIS, there is general lack of clear business models (or income-generating policies) to foster financial independence beyond external donor support and this could potentially compromise the future sustainability of the LMIS. Further, the focus for the majority of the AMIS and ICT-based digital solutions, is concentrated on crops more than livestock and at production more than marketing and other aspects of the entire agriculture value chain.

The majority of African livestock producers are older smallholders, who live in remote rural areas, where they lack appropriate access to markets for their animals and products due to deprivation in agricultural market information. The smallholder livestock producers have no adequate information on demand and supply, what to produce and when, and therefore can be exploited by other actors in the chain and receive low prices for their agricultural produce. This is because the ability of farmers to respond intelligently to the production and dissemination of livestock market information rests on their ability to access and interpret that information in their businesses. The livestock marketing information is not accessible by these resource-poor smallholder livestock farmers in most cases. This usually leaves them with no option but to dispose of their animals at economically unviable prices.

On a practical level, although livestock marketing information is in the public domain, the information is fragmented and scattered amongst various sources. There is not one source of livestock market-related information that provides all the information required by all stakeholders. For the decision

maker, it becomes very difficult to consolidate all these pieces of information from a myriad of sources. The real challenge, especially for the benefit of the smallholder farmer is to ensure that all these relevant pieces of information are packaged logically together for optimal use. However, due to the generally low levels of literacy in most African countries and poorly developed infrastructure, technology and communication systems in rural areas, resource-poor livestock farmers find it difficult to access and understand price information. This limits their participation in mainstream marketing activities, particularly so for women.

In most countries (but most prevalent in the ECCAS and SADC regions), the public sources for livestock market information are not comprehensive, lack proper coordination and integration, and have become largely privatized since the era of market liberalization. Although a few producer organisations and cooperatives have taken the initiative to develop commodity-based livestock marketing information systems for the benefit of their membership, the systems remain inadequate.

The major weakness of all LMIS found across the African continent is that the market information is thinly spread across several sources. In some countries and regions, efforts have been made to consolidate all the livestock market-related information into one system to enable users to have access to all relevant information from one source. Information from key informants consulted across the continent has revealed that those countries and regions attempting to consolidate the information have been hampered by lack of funding, limited human resource capabilities and inadequate support infrastructure. Countries and RECs that have managed to establish web-based MIS, the information is being complemented by mobile phone technology to enhance dissemination to those stakeholders who may not have access to the internet.

Careful selection and accurate identification of target markets are essential for developing an effective market information system for livestock value chain players. Out of a few marketing channels available, resource-poor farmers still prefer to market their commodities through informal channels due to the perceived high cost of compliance associated with participation in formal markets. This study also revealed a lot of important issues still to be addressed by support institutions in their efforts towards enhancing the participation of smallholder livestock producers in mainstream markets. One important observation is that the smallholder sector's inability to meet livestock market requirements is related to their lack of knowledge and information about market requirements.

From the study, the following recommendations are proffered:

Improved access to good local, regional, and international markets by all actors along the livestock value chain is needed to ensure a thriving livestock sector in Africa that has potential to reduce poverty, enhance food and nutrition security and foster local and regional economic growth. To be able to adequately respond to demand from local and regional markets requires good access to relevant and timely information as well as adequate transport and communication infrastructure and other support services that enable efficient market information sharing and timely delivery of animals and livestock products at the designated markets. Specifically:

- Since the importance of accessing market-related information by stakeholders in the livestock sector of Africa cannot be overemphasized, partnerships between livestock producer organizations and the commercial sector, relevant government ministries and departments, industry organizations and other relevant parties in generation, dissemination and utilization of relevant market information need to be strengthened within the livestock sector.
- For sustainable development of strong LMIS in countries across the RECs and on the African continent, there is need to gather, package and disseminate accurate, relevant, useful, timely and affordable market information that benefit all value chain stakeholders. The LMIS need to be complemented by other supportive government programs, policies and investments in infrastructure development, extension services and education. Feedback mechanisms need to be put in place as a mechanism for checks and balances to ensure relevance and usability of the information disseminated to the intended end-users.
- Farmer organizations and their commodity associations can play an important role in LMIS by providing reliable and accurate market information to their member livestock producers. The Zambia National Farmers Union (ZNFU) is one example of a demand-driven MIS that has potential for scaling (up and out) to other countries and regions of the continent. The LMIS component of the ZNFU AMIS needs to be strengthened to encourage livestock producers to utilize the platform for sharing knowledge and information on all relevant livestock marketing issues and appropriate technologies.
- Organization for collective action by livestock producers is important. Livestock producers' associations and cooperatives need to establish strong market linkages between the producers and agribusinesses as well as service delivery institutions. Ultimately, increased access to appropriate market information will enhance transparency and 'level the playing field' to enable livestock producers to make more better-informed decisions regarding when and where to market their animals and animal products.
- Stakeholders in the livestock sector, particularly the producers, need to be convinced about the benefits of having a well-functioning LMIS compared to the costs of not having one. This cost-benefit analysis can potentially enhance their 'willingness to pay' for reliable market information.
- Thus, there is need for deliberate engagement of the private sector and other non-state actors in the LMIS and to foster strong Public Private Partnerships (PPPs) for the development of clear business models that anchor sustainability of the systems. A balance has, therefore, to be struck between the public interest of achieving social well-being and the commercial (profit-making) interests of the private actors.
- The MISs are usually designed and developed with a public goods consideration, which is based on a strong state intervention and public service involvement, thereby making it difficult for the private sector and other non-state actors to identify their role in the system. There is need to engage and foster viable partnerships with mobile network operators and developers of digital applications to take advantage of the rapidly evolving ICT based solutions. The market information services provided should be demand-driven and responsive to the needs of all livestock value chain stakeholders, particularly poor smallholder producers, including women and youth, who are usually marginalized. The market information generated will only be useful if the intended beneficiaries can access and act on it to their advantage.

- An integral part of the whole LMIS are enumeration agents, who need to be recruited, trained, managed and paid to a greater extent through the system. In most cases, the enumeration task is delegated to agricultural extension officers, who are already overloaded with numerous other government errands. There is, therefore, need to have specialized and dedicated enumerators mandated to effectively undertake the enumeration tasks. For sustainable development of LMIS, there is need for these enumerators to be well capacitated and remunerated to ensure that they produce and disseminate accurate, timely and relevant market information.
- AU-IBAR needs to coordinate livestock stakeholders in the five RECS to take advantage of evolving ICT-based digital platforms, smartphones and other media to set up robust LMIS as a response mechanism to address existing livestock marketing challenges on the African continent. These challenges can be effectively resolved through availing more reliable market information and making it more readily accessible to all value chain actors in a more transparent manner. The coordination efforts need to ensure that the MIS best practices recommended through the Livestock Data Innovation in Africa project and other similar projects and initiatives across the continent and elsewhere, such as the LD4D, are adopted, implemented and scaled across all RECs in Africa.
- The AU-IBAR should develop a standardized model for the setting up of appropriate regional LMIS and provide institutional capacity strengthening in national governments and RECs for harmonized implementation of comprehensive LMIS.



1.0 INTRODUCTION

1.1 Background

This study on Market Information Systems audit on the state of livestock market information systems in Africa has been commissioned by the African Union Inter-African Bureau for Animal Resources (AU-IBAR). The AU-IBAR is a specialized Technical Office of the Department of Agriculture, Rural Development, Blue Economy and Sustainable Environment of the African Union Commission (AUC). Its mandate is to support and coordinate the sustainable development and utilization of animal resources (livestock, fisheries, and wildlife) to enhance nutrition and food security and contribute to the wellbeing and prosperity of the people in the Member States of the African Union (AU). The entity (AU-IBAR) accomplishes this mandate through supporting and empowering the AU Member States, the Regional Economic Communities (RECs), and other stakeholders in the sector. Its vision is that of an African continent in which animal resources contribute significantly to reducing poverty and hunger.

The AU-IBAR is implementing the Sustainable Development of Livestock for Livelihoods in Africa (Live2Africa) Project from 2018 to 2023, which aims to strengthen the systemic capacity of continental, regional, and national livestock sector stakeholders for the economically, environmentally, and socially sustainable transformation of the livestock sector. The Live2Africa Project is developed along seven Results aligned to the Livestock Development Strategy for Africa (LiDeSA) as follows:

- Result 1: Investments in livestock value chains (LVCs) are increased;
- Result 2: Animal Health Delivery Services are improved;
- Result 3: Animal Production, Productivity, and Ecosystem Management are enhanced;
- Result 4: Resilience of Livestock Production Systems are strengthened;
- Result 5: Technology adoption in the Livestock Value Chains is increased;
- Result 6: Access to inputs, services, markets, and value addition are increased; and
- Result 7: AU-IBAR capacities are strengthened.

The Live2Africa Project pioneers a comprehensive and integrated continental initiative that addresses all the subcomponents of livestock development utilizing a value chain approach, focusing on selected priority regional livestock value chains.

The focus of the study is on five regional livestock value chains identified and prioritized during a consensus building exercise conducted during the Live2Africa Livestock Value Chain Prioritization Workshop held in Nairobi Kenya 19th – 21st February 2019. The workshop brought together a diversity of livestock sector actors and resulted in the selection of the five value livestock chains presented in Table 1. These value chains were prioritized as the entry point for the AU-IBAR's Live2Africa value chain work in each REC.

Table 1: Identified and prioritized regional livestock value chains

Region	Prioritized Regional LVC	REC
Eastern Africa	Dairy VC Performance of the LVC	EAC
		IGAD
Central Africa	Poultry (eggs) VC Transformation	ECCAS
Northern Africa	Dairy Value chain (camel, buffalo, small ruminants) Transformation	UMA
Southern Africa	Meat and Live Animal VC Transformation	SADC
Western Africa	Poultry VC Transformation	ECOWAS

1.2 Justification

Changing climate, land degradation, land tenure issues, declining grazeable lands due to expansion in arable land and human settlements, and market access are some of the major challenges facing smallholder livestock producers across Africa today (Malabo-Montpellier Panel, 2020). Their ability to cope with these challenges requires new and innovative ways of accessing market information for decision-making in the context of changing climate. Access to relevant market information and their capacity to adapt are critical for adaptation (FAO and AUC, 2021). Thus, near-real-time market information can provide this service to assist the livestock producers and other stakeholders in risk management and decision making (GIZ, 2021). The majority of livestock producers in Africa are smallholders who are located in remote rural areas, with limited access to appropriate markets, agricultural market information and other infrastructure (Mburu et al., 2013). Due to these limitations, they tend to decide what and when to sell based on inadequate information regarding demand and supply. This situation exposes them to the exploitative tendencies of other actors in the value chain through being offered low prices and unfavourable terms of trade when they sell their livestock and livestock products (FAO, 2017). Market Information Systems (MIS) have proven essential in ensuring greater transparency of agricultural markets and improving their operation.

Although the focus and emphasis on livestock market information systems (LMIS) have a very short history in Africa, the LMIS have evolved rapidly and enormously in Africa evolving from first-generation to second generation LMIS (Sopov, 2018). Although many LMIS are operational in different countries and regions on the African continent, the quality of information they generate varies and depends on a number of factors, ranging from technical capability of human resources involved to technology used in data collection, processing and dissemination (FAO, 2017). The major challenge is related to being able to adjust the supply of market information to the needs of all the livestock value chain actors (according to specificities of the various products and value chains), while ensuring/securing financial sustainability of the LMIS (Wane et al., 2016). Thus, organizations responsible for setting up and implementing such MIS need empirical evidence to determine not only the reliability of information generated, but also the real impacts of accessibility and utilization of such information.

It can be argued that LMIS that supply livestock producers and other stakeholders with market-related information may not be sufficient. These stakeholders, particularly smallholder producers, require assistance with interpretation of the MIS to make them helpful, more appropriate and user friendly.

According to FAO (2017), this makes the role of extension and advisory services in LMIS indispensable. Livestock producers require support with LMIS to understand the functioning of market forces (i.e. aspects of supply and demand), the reason why producer prices tend to fluctuate. In most cases, market price information received via electronic media rarely originates from markets they have access and participate in (Malabo-Montpellier Panel, 2020). There is need for proper education targeted at livestock producers on aspects of transaction costs and price transmission along the value chain. Overall, the livestock producers need to understand the nature and specificities of quoted prices, whether retail, wholesale, buying or selling prices. Comprehensive and near real time market information among livestock value chain stakeholders can promote agricultural and local economic development. Besides assisting them with informed decision making, sound market information is critical for improved transparency, competitiveness and equitable distribution of value added among value chain actors. Effective LMIS have potential to enhance competitiveness, reduce information asymmetries and increase the efficiency of market performance (FAO, 2017). A good LMIS helps with enhancing livestock producers' awareness of and knowledge on market opportunities and, in the process, capacitate and strengthen their bargaining power when engaging

1.3 *With buyers.*

It also helps enhance governments' capacity to make appropriate policy and planning decisions supporting the growth and development of national and regional livestock value chains. Thus, for LMIS to be effective, they need to enhance the ease of doing business along the value chains through facilitating viable market linkages among actors. Purpose and Objectives

This study, therefore, sought to conduct a Market Information Systems Audit on the State of Livestock Market Information Systems in Africa. The overall objective is to strengthen the MIS at the regional level to ensure the collection, packaging and dissemination of information necessary for marketing livestock on a continuous and regular basis. The specific objectives of the assignment were to:

- Identify the types of market information systems in various regions that may potentially support livestock market activities;
- Outline observations on the use of identified Livestock related Market Information Systems; and
- Provide high-level recommendations to address identified weaknesses in utilizing existing market information systems for regional livestock market activities

1.4 *Methodological Approach*

The study was broadly guided by Live2Africa's Theory of Change (ToC). A systems requirement study was undertaken by examining information, infrastructure, skills and technology, and related services that make up the regional livestock market systems. To achieve this, SWOT Analyses of the various regional livestock MIS were conducted. The SWOT analysis made it possible to assess the various strengths, weaknesses, opportunities and threats within the market system. With the SWOT analytical technique, an attempt was made to provide answers to the questions related to each of the four words whose first letter forms the acronym. Strengths (advantages, area of excellence, relevant resources possessed and available institutions), Weaknesses (things to improve, areas of poor performance), Opportunities (available enabling factors, favourable trends and comparative advantages) and Threats

(obstacles that interfere with and hinder success, and areas to avoid). In the application of the SWOT technique to analyse livestock MIS in the five RECs, the organizational setting of market information systems and the indicators for determining their effectiveness, capabilities and efficiencies were examined. Carrying out an analysis using the SWOT framework helped focus activities on areas of strengths and where the greatest opportunities lie. For this study, the SWOT analysis was carried out on the organizational setting, and it focused on the regional systems of livestock marketing service delivery. Thus, the study adopted both qualitative and quantitative approaches in order to:

- i. Identify current and future priorities in terms of information, infrastructure, skills and technology, and related services.
- ii. Conduct a SWOT analysis for examining the Strengths, Weaknesses, Opportunities, and Threats of existing Market Information Systems;
- iii. Assess infrastructure capabilities and knowledge resources;
- iv. Undertake a knowledge inventory analysis by identifying the explicit or physical MIS
- v. Identify gaps between available infrastructure and needed capacities based on regional livestock market priorities and capitalize on strengths or make improvements.

Since it was not possible to travel to specific countries and RECs to collect primary and secondary data, virtual platforms such as Zoom, Microsoft Teams, Skype, WhatsApp, etc., were used to interview and collect data from selected key informants. High profile key informants from reputable institutions within Africa were targeted from AU-IBAR continental network of stakeholders, including women, youth and policy-making bodies (RECs, Governments, Ministries, Departments, Parastatals) and non-state actors (Private sector, Farmer Organizations, NGOs, Development Partners/Donors, CSOs, CBOs, etc.). The purpose of the key informant interviews was to gather relevant data and information on existence, appropriateness, effectiveness and relevancy of various regional MIS related to the livestock sector. This methodological approach considered issues of limited budget and COVID-19 regulations and guidelines, particularly the one on movement restrictions. Appropriate tools were developed for soliciting comprehensive and relevant data and information for the development of the MIS audit report. Given the anticipated challenge of securing appointments with high-profile individuals, the interview questions were uploaded on Survey Monkey and shared with the targeted key informants by email. Responses were received between January and February 2022 from 42 respondents from 17 African countries. Fig 1 shows information regarding the institutional affiliations of the consulted key informants.

In developing the livestock MIS Audit report, an extensive desk review of relevant literature on the subject matter was conducted focusing on the specific RECs. This included literature on local, regional and international best practices on livestock MIS. Through a comprehensive review of literature and internet search, over 60¹ ICT-based digital applications related to AMIS have been identified across the African continent, of which over 50 percent specifically deal with livestock-related market information. The EAC seems to have the highest concentration of these digital applications, with Kenya dominating the development of innovative MIS.

¹ There could be more applications scattered in many countries across the continent that could not be identified during the course of the study.

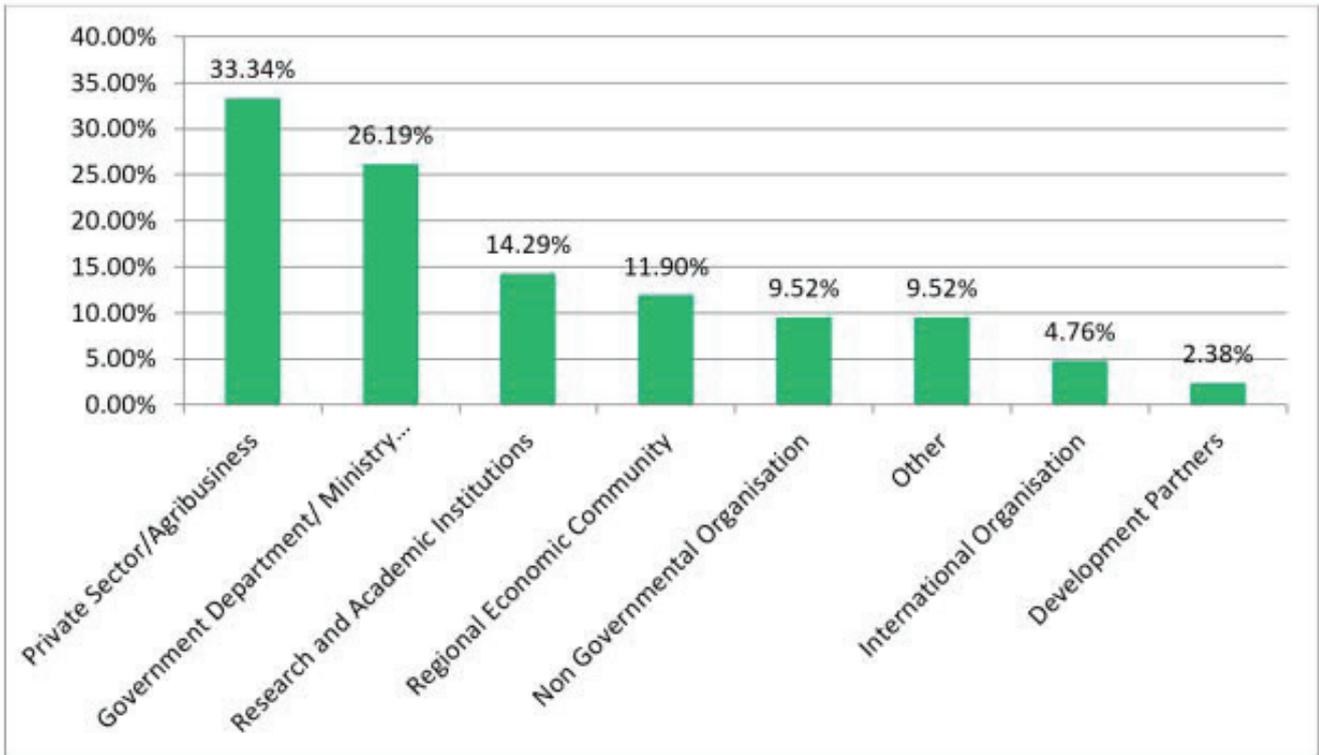


Figure 1: Institutional Affiliations of Consulted Key Informants

1.5 Report Outline

The report is structured into six sections outlined as follows:

The first section is an introduction to the study, outlining the background to and justification for conducting the study. It highlights the purpose and objectives of the study as well as the methodological approach adopted.

The second section provides a review of literature focussing on evolution of MIS and opportunities from emerging ICT and digital solutions.

The third section looks at efforts being made towards development of comprehensive LMIS based on assessment of demand and supply of market information with a view to identify weaknesses and gaps in systems.

The fourth section focuses on analysis of regional LMIS found the five RECs and their potential in terms of supporting livestock marketing activities.

The fifth section conducts a SWOT analysis of the LMIS to highlight the strengths, weaknesses, opportunities and threats within the regional LMIS.

The sixth section presents the conclusions and recommendations from the study.

2.0 REVIEW OF LITERATURE ON MARKET INFORMATION SYSTEMS

Market Information Systems (MIS) have been defined as a system in which marketing data is formally gathered, stored, analysed and disseminated to stakeholders on a regular basis in accordance with their information needs (Jobber and Fahy, 2009). Armstrong and Kotler (2006) describe the MIS as consisting of people, equipment and procedures to gather, sort, analyse, evaluate and distribute needed, timely and accurate information to marketing decision-makers. In Africa, MIS were introduced in the context of structural adjustment policies from the 1980s and 1990s. The aim of introducing the systems was to overcome knowledge deficits and imperfect information, a situation created after states withdrew from markets (Sopov, 2018). Although several agricultural market information systems (AMIS) exist in Africa, the validity, reliability and impact of information generated vary and depend on a number of factors, including technology used, technical capability of personnel, management and transmission (Godiah et al., 2014). According to Mawazo et al. (2014), basic products of MIS include ‘market news (e.g. information on prices, quantities), market analytical reports (e.g. reports that analyse factors causing changes in market conditions and their effects on value chain stakeholders), and business reports (e.g. providing information that can help stakeholders identify new opportunities)’.

Thus, MIS emerged as an accompanying measure to market liberalization as a way of improving competitiveness and functioning of markets. The MIS were intended to correct the asymmetries created by economic liberalization, give bargaining power to farmers, create a transparent open trading environment and foster an efficient market system for all stakeholders (FAO, 2017). Criticism for the MIS in Africa emanates from the fact that the information provided is often inaccurate and usually reaches farmers too late to be of practical use. Governments often seek to please all stakeholders involved by attempting to cover far too many locations and variables, which imply very high costs at the end. Eventually, most of the services end up exhibiting more of a statistical orientation than a commercial one (Sopov, 2018). For this reason, most of the MIS initiated in Africa have either collapsed, after initial donor assistance ended, or continue to struggle along with very little impact.

Inter-reseaux (2008) notes the reason why most MIS continue to close down on a regular basis as being that AMIS are very expensive systems that are not easy to set up and operate. As such, they have most often remained public owned and financed by governments and donors, providing market information for free. However, in recent years, more private AMIS have emerged in Africa and are providing relevant market information that has to be paid for. This has raised some pertinent questions as to whether MIS should remain as public goods which should remain as part of national budget expenditures or they should be considered as investment and trade development opportunities for the private sector. For sustainable financing of the AMIS, a public-private partnership model should be considered. However, the real impact of AMIS still remains particularly difficult to measure since rates of return on investment in the AMIS are significantly influenced by assumptions made about elasticities of supply and demand (Wane et al., 2016). Also noted by FAO (2017) is that the commercial viability

of the private sector driven AMIS like eSoko is yet to be demonstrated. For this reason, AMIS in most African countries and even in some developed countries are still considered to be public goods. Thus, AMIS as public goods should provide correct and reliable information on market conditions to enable informed decision making by value chain stakeholders.

Research has also demonstrated the potential of MIS to increase value-chain efficiency by strengthening vertical links among various actors. This is because information deficiency and asymmetry has consistently crippled economic growth and decision-making at various value chain levels. However, with the evolution of ICT, particularly mobile technology, rapidly penetrating Africa at a larger scale, the ability to capture data at individual and household levels has provided tremendous opportunities to gather near real-time trade information over livestock to ensure informed decision (WANE et al., 2016). Thus, an ideal LMIS should have information on:

- livestock prices, price fluctuations, trends and related matters;
- livestock products, and characteristics;
- livestock marketing channels and related matters, and promotion of livestock production and related matters

2.1 Evolution of Market Information Systems

Originally, agricultural MIS delivered mostly price information, and not necessarily in a timely manner, e.g. once per week or once per month (FAO, 2017). These MIS systems were set up and managed by governments with mostly policy improvement in mind. The first-generation of AMIS in Africa was broadly based on famine early warning systems that focused on country-specific sectors and commodities to exclusively deliver price-related information as well as data collection on pre-identified and sampled markets, to compute median price information disseminated for free (Wane et al., 2016). Another important feature of the first-generation AMIS was their heavy dependency on funding from public expenditure structures or projects and international donor funding. Following the limitations of the first-generation MIS in terms of meeting the expectations that had initially been raised at their inception, the systems have continued to evolve. A second-generation of AMIS has recently emerged, which is more diversified and attempts to better target the information needs of all (private and public) actors in agricultural value chains (Inter Reseaux, 2008). Even if they appear to be more powerful and effective than the first-generation MIS, these second-generation MIS are gradually evolving, and their efficacy remains to be critically evaluated. Thus, there is need to subject them to deeper analysis, comparison and evaluation.

With growing access to information communication technology (ICT) such as internet-based web applications and mobile phone technology, a second-generation AMIS emerged during the 2000s, with capability to leverage on private sector engagement. They started to provide additional information beyond the traditional market price indicators to encompass input prices, weather forecasts, trading platforms matching producers and buyers etc.). Later on, to meet the needs of private sector actors, the AMIS began to deliver additional services: more frequent price information at different markets, information on different produce from input to final produce, selling – buying offers, sellers/buyers contacts, weather forecast, stock availability, market analysis, etc. (Sopov, 2018; FAO, 2017). Of recent,

in this second-generation AMIS, market prices have been integrated with other mobile agriculture information tools to provide additional information, including agricultural extension advice, input price information, weather forecasts and trading platforms to match producers with buyers. Two decades down the line, the systems have tended to be created and led by the private sector players or farmers (GIZ, 2021). Some notable private sector-led AMIS initiatives across Africa that offer promise of financial sustainability through the sale of information to users, typically through SMS and specialized reports, include Esoko in Ghana and M-Farm in Kenya. AMIS in other selected countries include Infotrade in Uganda, RATIN in East Africa, KACE Market and Information Linkage System in Kenya, Remote Livestock Marketing System in Zimbabwe (Chiatoh and Gyau, 2016). Presented in Table 2 are some examples of first- and second-generation MIS found across Africa.

Table 2: Examples of first- and second-generation MIS in Africa

Examples of Government-led First-Generation MIS	Private Sector-driven Second-Generation MIS
<ul style="list-style-type: none"> • Agricultural Market Observatory in Mali (OMA) • Agricultural Market Information Center in Zambia (AMIC) • Siarm in Senegal • Agricultural Market Information System in Mozambique (SIMA) • Information System of Agricultural Markets in Niger, • Information Systems on Livestock Markets in Niger • System of Agricultural Information Products Guinea (SIPAG) in Guinea Conakry • Agricultural Marketing Information Services (Cameroon) 	<ul style="list-style-type: none"> • Housed in or run by farmer organizations (e.g. Observatoire du Marche' Agricole in Mali) • Economic Information System of Vegetables in Madagascar • Zambia National Farmers Union SMS in Zambia • Esoko in Ghana and other African countries, • Infotrade in Uganda, • KACE Market and Information Linkage System in Kenya) • Regional Agriculture Trade Intelligence Network or RATIN (based in Kenya but operating throughout East Africa). • Agricultural exchanges, such as the Ethiopia Agricultural Exchange, which generate some aspects of market information as a by-product of their facilitation of open and forward-market trading • Agricultural Input Market Information and Transparency System – AMITSA (East Africa) • Lima-Links (Zambia) • Livestock Market Information System - LMIS (Ethiopia, Kenya, Tanzania, Somalia) • M-Farm (Kenya) • Nokia Life Tools (Nigeria)

Box 1: Regional Agricultural Trade Intelligence Network (RATIN) in the EAC Region

The Regional Agricultural Trade Intelligence Network (RATIN) was established in 2003 to provide MIS for grains in Burundi, Kenya, Uganda, Tanzania and Rwanda (EC, 2012). RATIN was developed to help reduce regional food insecurity by strengthening the ability of markets to provide poor households with access to affordable food and to improve food availability through providing adequate incentives to producers. RATIN started as a collaborative effort comprising three USAID projects: Famine Early Warning System Network Project (FEWS NET), the Regional Agricultural Trade Enhancement Support Program (RATES), and Eastern Africa Grain Council (EAGC). The major task of RATIN is to supply traders with improved early marketing and trade information that would lead to more efficient and competitive transactions in food trade between surplus and deficit regions in East Africa. Plans are in place to expand the coverage of RATIN to all the 10 countries in the Eastern African region and further develop partnerships in the Southern, Western and Northern Africa regions for increased market coverage. DRC, Malawi and South Sudan now part of RATIN

The FAO and AUC (2021) point out that market information systems and statistics on trade in Africa generally share several characteristics. Some of these characteristics are institutional capacity and infrastructural weaknesses, a shortage of skilled human resources and underinvestment over many decades. As a result, data collection, analysis and dissemination tend to be limited and not reliable with some exceptions. Due to the continent’s weak market infrastructure, regional and country markets often tend to be localized and fragmented, with weak transmission of prices between markets causing sharp fluctuations in prices (FAO and AUC, 2021). Therefore, it is common to experience commodity shortages in one subregion coinciding with surpluses elsewhere within the same country or region. Thus, establishing comprehensive agricultural market information services is regarded as one way of enhancing efficiency of marketing systems and promoting improved price formation (Godiah et al., 2014).

2.2 Opportunities presented by ICTs

Various ICT platforms that have emerged and continue to emerge across the African continent as digital solutions to enhancing market access by smallholder livestock producers. These agricultural e-marketplaces are virtual trading marketplaces that are providing important market linkage solutions that bring together individual buyers and sellers with little or no human intermediation. These systems offer market opportunities for traders of live animals and livestock products like meat, eggs and dairy products to generate better incomes (GIZ, 2021). Wane et al. (2016) note that mobile technology is rapidly penetrating the African continent at a larger scale, presenting tremendous opportunities for individual and household livestock producers and traders to gather, capture and share real-time data and information for improved decision making. Despite being the majority owners of small ruminants and poultry, women and other vulnerable smallholders continue to lag in access to modern technologies. Modern ICTs help in terms of providing digital solutions to linking smallholders to markets through accessibility of accurate information by all value chain actors.

GIZ conducted a study to review successfully implemented ICT-based digital solutions across the African continent and found that the solutions tend to work better when they are user-centred and flexible. The user-friendliness emanates from the sense that they combine the right mix of digital and physical elements in their design (GIZ, 2021). A few selected ICTs with potential for LMIS development are presented in Table 3.

Table 3: Selected ICT solutions for LMIS in Africa

Name of Application	Brief Description
eSoko	Seeks to enhance farmers’ access to digital and other support services in agricultural value chains, facilitating other chain actors to link with farmers across many African countries
Agro Market Day	A virtual market place that provides information about market prices in local markets and information about disease outbreaks in Uganda
eMilk	Dairy cooperative management software that integrates a cloud-based dairy management system that aids dairy cooperatives to fully automate their management in Kenya.
Herdy Fresh	A platform connecting farmers with urban customers thereby shortening transportation time and reducing distance and infrastructure costs in Kenya.
Hlibna	A management system that provides Délice-Danone, Tunisia with comprehensive data about their producers and the milk volumes delivered, including farm management and animal health care.

Name of Application	Brief Description
Livestock247	A livestock marketing platform that integrates offtake and input market information to create transparency in livestock trade in Nigeria.
M-Farm	An online marketplace for linking Kenyan farmers and consumers directly through provision of current market price information.
Mifugo Trade	Digitizes livestock trade for pastoralists in Kenya to avoid middlemen by directly connecting livestock farmers and buyers online.
Selina Wamucii	A platform integrating smallholder farmers, pastoralists and fishing communities across Africa into local and global supply chains.
Sokoni	A livestock marketplace that directly links pastoralists and traders in Kenya to avoid large price variations, unnecessary inconveniences.
UsomiRubi	Virtually aggregates produce from farmers across East Africa to help them access markets and receive better prices by benefiting from economies of scale.

Source: Derived from GIZ (2021)

FAO and ITU (2022) assessed the status of digital agriculture in 47 African countries. They found that the continent's youthful population and increased mobile penetration presents huge potential for digital agriculture transformation despite the countries being at varying stages of transformation. Despite this great potential, there are barriers related to weak infrastructures in rural areas, limited funding and investment in R&D, agro-innovation and agricultural entrepreneurship. The creation of favourable and enabling environments for businesses and start-ups was found to be a challenge for the majority of the countries. Digital skills were found to be low among citizens, but particularly so for women, youth and rural residents. Another challenge identified was the misalignment between ICT policies and existing agricultural policies. The majority of the ICT interventions focused on crops more than livestock and production more than marketing and other aspects of the entire agriculture value chain.

It is argued that technology-enabled interventions are no panacea to the challenges facing LMIS; they need back up from complementary investments in physical infrastructure, human resources (literacy and numeracy), energy and power, etc. (Sopov, 2018).

3.0 DEVELOPMENT OF LIVESTOCK MARKET INFORMATION SYSTEMS

Livestock market information systems (LMIS) refer to services designed to gather, process, package and disseminate data and information related to the status and dynamics of market prices for livestock and livestock products. According to FAO (2017), the development of LMIS in Africa has a short history, initiated during the 1980s as an essential part of the agricultural marketing reform processes. The LMIS are an element of the broader AMIS, which were initiated to support the market liberalization and structural adjustment policies that sought to promote engagement of the private sector to play a more pronounced role in agricultural markets and reduce the role of state-owned marketing statutory bodies. Although initially developed by national governments, the LMIS have generally received considerable financial support from international donors. A case in point is the Livestock in Africa: Livestock Data Innovation Project, funded by the Bill & Melinda Gates Foundation as a three-year (2010-2012) pilot on ‘Improving Data for Better Policies’ in Africa. The Livestock Data Innovation Project was jointly implemented by the FAO, ILRI and World Bank, in collaboration with AU-IBAR and piloted in three countries of Niger, Tanzania and Uganda. The project worked with national governments and institutions of the three governments to ‘pilot and develop methodologies for identifying, collecting and analysing livestock data’ (Ciamara et al., 2014). It supported the identification of livestock data and key indicators that foster policy formulation and pro-poor investment by institutionalizing the data into national frameworks of agricultural statistics. The project produced two important outputs that can be useful tools in developing comprehensive LMIS across all African countries:

- A Sourcebook on Livestock Data in Africa, which is a user guide for collecting and analysing livestock-related data to better understand and respond to the key developmental issues in the livestock sector.
- An advocacy document Making the Case for Investing in Livestock in Africa that provides empirical evidence on the role of livestock and recommendations on enhancing the contribution of livestock to poverty alleviation and economic growth.

In 2018, FAO launched a USAID-funded project entitled Africa Sustainable Livestock 2050 (ASL 2050), which seeks to investigate the possible futures of the continent’s livestock sector. Operating in six countries (Burkina Faso, Egypt, Ethiopia, Kenya, Nigeria, and Uganda) across Africa, the ASL 2050 seeks to improve access to sufficient information by national, regional, and continental institutions to ensure promotion of policies and practices that ensure ‘a sustainable livestock sector in the long term’ (Malabo-Montpellier Panel, 2020). In 2015, the Common Market for Eastern and Southern Africa (COMESA) had launched a regional livestock policy framework that provides guidance to member states on promoting and improving intra- and inter-regional trade in livestock and livestock product. The COMESA Livestock Policy Framework also seeks to strengthen livestock production in member states through development of national livestock development policies. Although national-level livestock policies and legislation in most member countries are often included as part of the broad agriculture sector development policies, some members like Zambia and Zimbabwe have already

developed their country-specific livestock development policies, plans and strategies. The emphasis in all these initiatives is on availability of good quality MIS.

Of late, there has been an increase in private sector-led initiatives towards the development of LMIS, including ICT-based livestock trading platforms such as the LMIS in selected East African countries (Ethiopia, Kenya, Tanzania), Remote Livestock Marketing System (RLMS²) in Zimbabwe, and eSoko in many African countries. Despite some major inroads made towards increasing agricultural market information accessibility, the development of LMIS still lags behind in a number of African Regions and their specific countries. Furthermore, the LMIS would become more useful if the intended beneficiaries and final users are capacitated to actually utilize them and if they are supported by specific complementary national and regional policies and programs such as investment in infrastructure development and education (Wane et al., 2016). There are various information needs for livestock farmers ranging from market opportunities, price, quantity, quality, demand, and information on prevailing production techniques and market conditions. However, that information across Africa is still developing and the following sections present what is currently obtained in different African regions, which can support further development of the LMIS.

Box 2: LMIS Development through the Livestock Information Network and Knowledge System (LINKS) Project in Kenya

In Kenya, beginning 2003, the Livestock Information Network and Knowledge System (LINKS) Project, in collaboration with the Ministry of Livestock and Fisheries Development, designed and piloted an information communication technology module for reporting livestock prices, mainly focusing on markets in the pastoral areas. Following consultations and demonstration of the functioning of the LINKS project ICT in reporting and disseminating livestock prices, stakeholders in livestock marketing adopted the LINKS protocol to develop a national livestock marketing information system (NLMIS) for Kenya (Kariuki et al., 2008). Efforts of different stakeholders resulted in the country coming up with a unified system that provides information on prices of different livestock species that are traded in the key livestock markets. The overall objective of the Kenyan NLMIS is to improve market information for all livestock stakeholders, particularly producers and traders. The NLMIS allows users to minimize the costs of doing business by reducing their reliance on brokers for information and to conduct market transactions on their behalf (Kariuki et al., 2009).

The suite of technologies developed by the LINKS project was adapted to develop and implement a national livestock marketing information system (LMIS) for several EAC countries. In Kenya, the system was formally launched in July 2007 as a single rich system that provides opportunities to add value through gathering national information and reaching a wide clientele through collective dissemination efforts. The NLMIS system, the first of its kind in Kenya, currently provides the country with a unified system of information on prices of the four different livestock species (camel, cattle, goats and sheep) traded in key livestock markets. It is currently linked to 68 markets across the arid and semi-arid counties of the country (The NLMIS is accessible on: <http://www.lmiske.go.ke/lmis/home.htm?action=getData>). The Kenyan Government, in collaboration with development partners, is in the process of expanding coverage to include the yet to be covered counties, broadening on the number of livestock species reported include livestock products into the system.

² The RLMS was developed by Allister Banks with grant funding from the African Enterprise Challenge Fund (AECF)

3.1 Insights from Livestock Key Informants Survey

The main providers of livestock market information that feeds into LMIS were indicated to be predominantly state governments (75%) followed by non-state actors (12.5%) as shown in Fig 2.

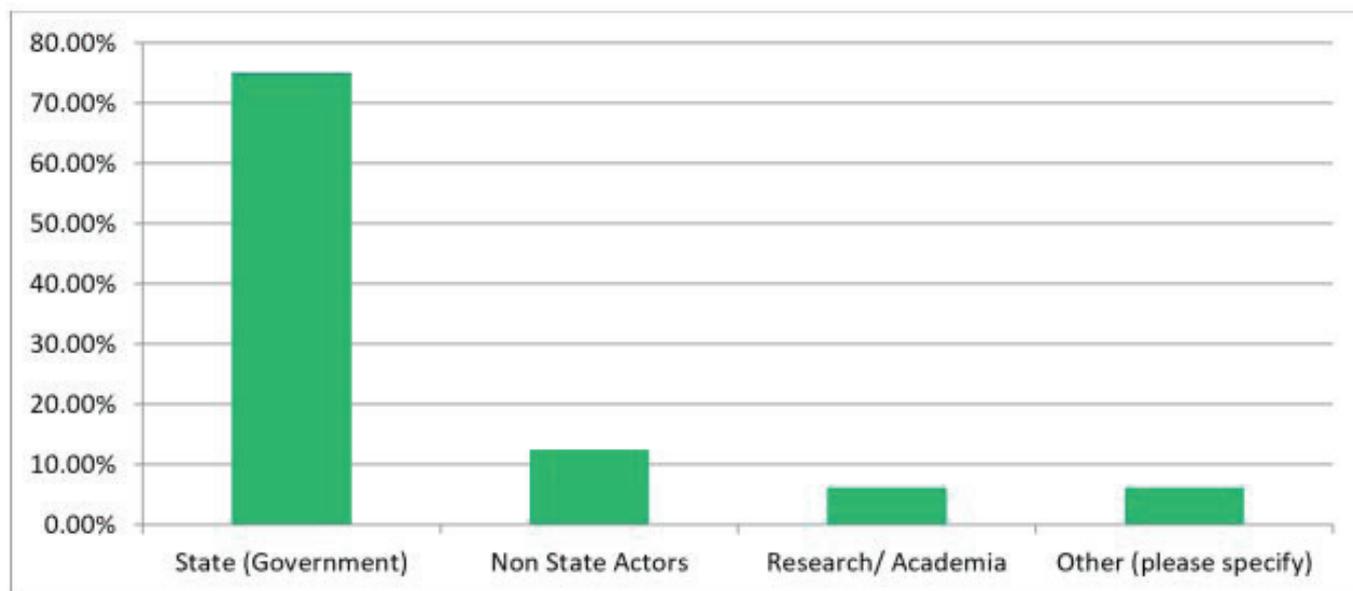


Figure 2: Sources of livestock market information

Although the state was singled out as the main source of livestock market information, livestock farmers and consumers of livestock products were indicated by some key informants as predominantly relying on traders and processors of livestock and wholesalers/ retailers for market information. The statistical arm of the Food and Agriculture Organization (FAOSTAT³) and Esoko featured dominantly as reliable non-state sources of livestock market information. FAOSTAT is an online database that provides access to data on food and agriculture (including livestock) from 1961 to date for over 245 countries and territories, including those in Africa. Of all the regional sources of livestock market information, FAOSTAT is believed to provide the most reliable and comprehensive market information for livestock in near real-time. Livestock producer prices and price indices for the various livestock types are available month-on-month and year-on-year disaggregated by country, region and by special groups.

Most stakeholders feel that although demand for LMIS is very high, there are huge limitations when it comes to their availability, accessibility and utilization by the intended beneficiaries. As noted by one respondent from West Africa, “The ECOWAS region has the Livestock market information system in existence which is a model in the overall ECOWAS Agriculture Regional Information System (ECOAGRIS)” and another alluded to the fact that “...although market information is available, and accessible online free of charge, it is only utilized by industry and Governments and does not cover informal sector”.

The supply of LMIS is ranked very low mainly due to the poor quality of the market information services (60%), the inadequacy of the MIS delivery infrastructure (60%) and inappropriateness of the MIS (33.3%). Provision of data and information for inclusion in LMIS is not confined to any particular

³ FAOSTAT provides free access to food and agriculture data for over 245 countries and territories and covers all FAO regional groupings from 1961 to the most recent year available (<https://www.fao.org/faostat/en/#home>).

section of value chain stakeholders but the level of contribution differs from country to country and region to region depending on the level of organization of the actors. The comprehensiveness of the data and information gathered, analyzed and disseminated differs from one system to another but generally, there is lack of standardization in terms of the type and nature of information offered by the different LMIS across the continent. Simple systems provide basic information on livestock production (population and demographics), marketing, price and trade statistics (e.g. the CLiMIS in South Sudan and the Somaliland LMIS). However, there are some systems such as LMIS in Ethiopia that are more comprehensive in terms of gathering and disseminating data and information on livestock numbers and types and products on offer, prices and trade (export and imports) by geographic markets and food situation through daily, weekly, monthly, quarterly and annual bulletins. It is important to note that the frequency of provision or dissemination of the market information varies depending on the context but was largely indicated to be infrequent and irregular by the key informants.

The major challenge highlighted by the respondents associated with such LMIS pertains to the reliability of the data and information provided and the unavailability and inaccessibility of the information to livestock producers since it is mainly disseminated via electronic media. These are largely inaccessible to them due to affordability issues and limited infrastructure and technical know-how. For some of the LMIS, in trying to be relevant to all stakeholders in the livestock sector, they end up trying to encompass various aspects of the value chain across wide geographic coverage and in the process tend to lose focus and accuracy. There were indications from some respondents that some of the LMIS end up covering aspects of animal health and diseases, early warning, food security updates, inputs availability, etc. According to the respondents, the information contained on national and regional LMIS is mainly packaged in MS Excel format but also as graphs and tables in weekly, monthly, quarterly and annual bulletins. Various print and electronic media (brochures, bulletins and reports) and online platforms, including social media (Facebook, WhatsApp, Twitter and Instagram) are used in disseminating the livestock market information.

The current LMIS is generally ranked very low in terms of adequacy, appropriateness and effectiveness, with more than 90% of the respondents indicating lack of satisfaction with adequacy, appropriateness, and effectiveness of the currently existing LMIS in their countries and continental sub-regions. However, in terms of relevance, the level of satisfaction is high (over 50%), indicating the need for a properly structured and comprehensive LMIS. Gaps were indicated to exist between available and required capacities in regional LMIS in terms of limited capabilities to analyse and simplify the market information into formats appropriate for and comprehensible to all stakeholders, particularly the producers. One of the major challenges highlighted is limited capacity to capture data on transactions that take place in informal markets, where most of smallholder livestock producers participate. These informal markets are indicated to account for a significant proportion of livestock marketing activities across countries and sub-regions on the continent. To address this gap, stakeholders suggest that governments need to commit more resources and investments towards the improvement of marketing infrastructures and strengthening market institutions by recruiting and adequately equipping human resources dedicated to LMIS. It was the recommendation of livestock stakeholders on the African continent that the AU-IBAR should collaborate with RECs and Governments through provision of

technical expertise and capacity building for coordination, harmonization and standardization of innovative LMIS across sub-regions and the entire continent. However, there was a consensus among the livestock stakeholders that funding and budget allocations towards MIS in general and LMIS, in particular, is currently very limited. The implication is that the quality of services provided becomes compromised.

Opportunities were said to exist for enhancing the performance and effectiveness of LMIS because of growing political will and the rapid evolution of ICT such as the growing mobile phone penetration on the continent. Effective LMISs were said to improve transparency along the value chains and enhance the potential to attract increased private sector investments in and other forms of funding towards the livestock sector. Furthermore, for enhanced collaboration and integration of existing LMIS to promote regional livestock value chain interventions, stakeholders suggest that opportunities need to be maximized in terms of political will, awareness creation, collective action, capacity building, and harmonization of national, regional and continental systems.

3.2 Demand for livestock market information in Africa

Generally, there is a perceived very high demand for livestock market information. The availability and accessibility of market information is believed to influence production decisions by farmers, through answering questions on what to produce, when to produce, how much to produce and what quality to produce? One key informant commented that: “livestock market information systems make it possible to highlight the traceability of livestock products; assess animal flows through markets; assess the consumption pressure of livestock products; assess the quality of animals available in the area; and take management action, including conservation of endangered species”.

Some respondents asserted that the market information gathered may be available, appropriate, accessible, but the availability and accessibility of such LIMS online need to be affordable or free of charge to the end users. The market information is available in MS Excel, PDF, MS Word formats, brochures, online (bulletins, graphs and tables, annual reports) and of late social media (WhatsApp, Twitter, Facebook, etc.). Despite this assertion, other respondents lamented that the information is not readily available and accessible, particularly to the smallholder livestock producers. The concerns are that the information is not gathered properly and hence there is “missing of relevant information and lack of accuracy in reporting”. Some sources of information are reportedly unknown to some livestock producers, and in most cases, ‘the information collected does not cover the informal sector’. As highlighted by one respondent, “Formal sector information is in good supply, but informal sector data is lacking. Secondly, production and export data and information are available but internal value chains data not available (What happens to the value chains that are not exported?)”. Other respondents attributed the lack of access to livestock market information to “the underdeveloped livestock keeping areas due to lopsided policies” (See Figure 3 for more reasons).

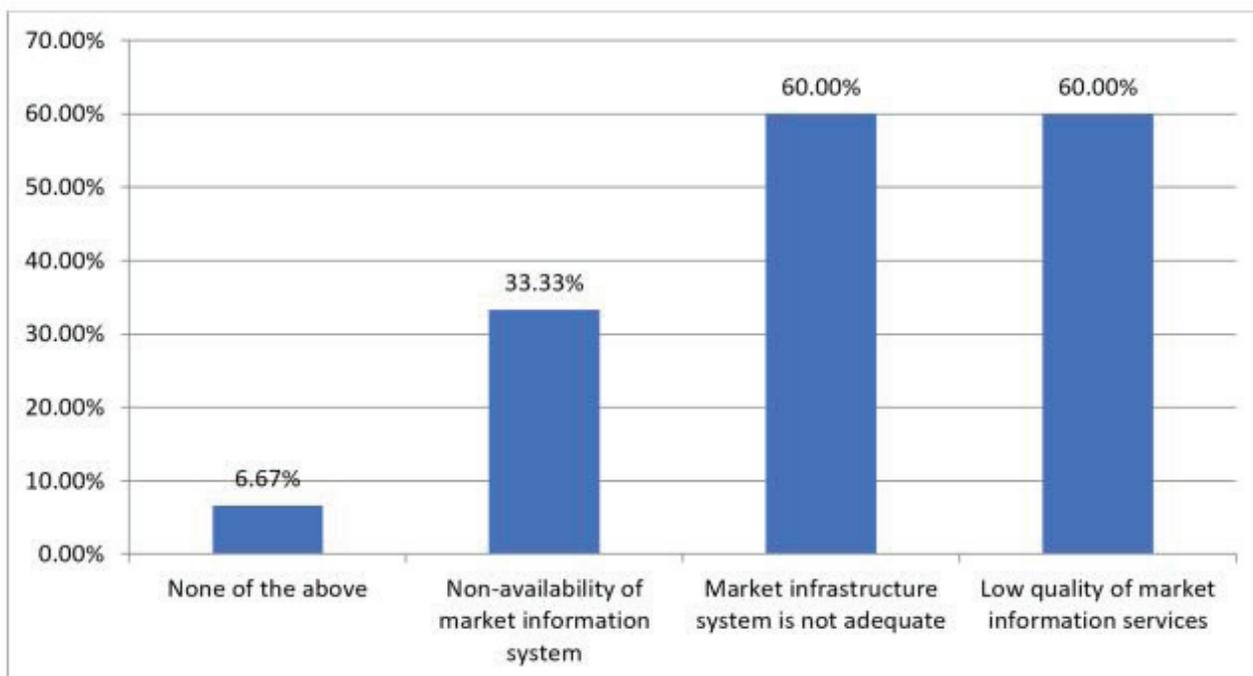


Figure 3: Reasons for lack of access to livestock market information

Sixty percent of the respondents attributed the lack of livestock market information to the market infrastructure that is not robust, 60 percent ranked the market information available as of poor quality, and 33 percent attributed that lack of access to information to the non-availability of LMIS.

3.3 Women, Youth and LMIS in Africa

With approximately 250 million women engaged in livestock rearing in Africa, there is a serious gap in their representation in emerging livestock value chains and markets. Regarding women and livestock development, Mburu et al. (2013) note that market information becomes an important economic resource. They allude that “information poverty” has increasingly become one of the prime causes of underdevelopment for women and youth in agriculture in general and livestock production in particular. It is further highlighted that the third major challenge facing women in African countries, after poverty and violence, is lack of access to information. In most African countries, livestock represents the only non-land asset they can own relatively easily compared to acquisition, ownership and control over land and other physical or financial assets. Livestock ownership, particularly small stock, therefore, represents a major source of livelihood, income and an opportunity for women’s economic empowerment through wealth accumulation, and the household food and nutrition security benefits. Bridging the livestock gender gap requires specifically tailored programs that target improving women’s ownership of livestock and facilitating their increased participation in and beneficitation from livestock value chains and MIS. This could ultimately help move them out of poverty (Malabo and Montpellier Panel, 2020). Thus, governments and other stakeholders in the livestock sector should put concerted efforts towards levelling the playing field such that anyone (both male and female) interested in participating in livestock markets is well represented.

4.0 ASSESSMENT OF REGIONAL LIVESTOCK MARKET INFORMATION SYSTEMS

There are various types of market information systems found in various regions of the African continent with the potential to support livestock marketing activities. However, there are very few that focus specifically on livestock marketing. The major focus for most of the MIS is on crop production and food security, with particular emphasis on staple crops. In most of the MIS, livestock marketing activities are only embedded as a component of the AMIS. Considering that livestock value chains across Africa present significant opportunities for wealth creation and improving the livelihoods of poor rural households (Mafukata, 2015), market participation becomes a determining factor in the commercialization of livestock production by poor rural households. Limited access to appropriate LMIS has influenced market preference and participation of smallholder livestock farmers towards informal marketing channels relative to formal channels (Thomas et al., 2014). Transactional costs also play a huge role in determining farmer choices of marketing channels as they act as barriers to the efficient participation of farmers in different markets (Musemwa et al., 2008). The remote location of most cattle producers, coupled with poor road and communication networks, results in high transaction costs, which reduce net incomes realised by the farmers from selling livestock. Access by smallholder farmers to information sources such as radios, televisions, mobile phones and internet facilities is still limited. Constrained interaction between extension officers and farmers due to poor communication infrastructures further enhances the limited transfer of information, skills and knowledge. Capacity building through education and training will further improve farmers, allowing for informed decision choices.

Generally, there is very limited availability of comprehensive and high-quality, reliable and frequently collected data and information on livestock production and marketing in Africa. This LMIS deficiency hampers the design and implementation of appropriate policies, strategies, and investments towards livestock sector development. It further renders the sector's potential contribution to economic growth and food system transformation largely untapped. Despite there being a variety of livestock-related indicators in many African country statistical agencies, covering aspects of animal populations and figures on production, marketing and consumption of livestock products such as meat and dairy, the quality of available data is often questionable, with some livestock experts doubting the quality of even the most basic indicators like livestock population figures reported for their countries and regions, in terms of timing and accuracy. They argue that livestock marketing aspects tend to be overlooked in regular nationally representative agricultural surveys, which emphasize on staple crop production and marketing aspects. There are limited specialized livestock surveys undertaken by national governments across the continent. In the rare cases when they are conducted, the emphasis is usually on production, productivity and animal health issues.

A new livestock data portal launched in 2017, Livestockdata.org, is a platform for sharing evidence generated through the Livestock Data for Decisions (LD4D) community on the livestock sector in low and middle-income countries (LMICs), including Africa. Administered by Supporting Evidence-Based Interventions (SEBI) based at the Royal School of Veterinary Studies at the University of Edinburgh, LD4D is a Community of Practice that aims to spearhead informed decision making based on enhanced use of existing livestock data and analyses. The portal seeks to create a demand-driven knowledge base of open access data, interactive tools, and visualizations that policymakers and investors can use to make evidence-based decisions (Malabo-Montpellier Panel, 2020). The ultimate goal of the LD4D is to guide investments that have the potential to improve the livelihoods and incomes of smallholder livestock producers in LMICs. Data is provided by members, including reputable institutions such as FAO, ILRI, and the Food Systems and Global Change group at CSIRO. Since the LD4D network is made up of mostly donor-funded organizations from livestock sectors across the globe, it can be criticized for being elitist in its composition, having little or no representation of livestock producers.

4.1 Southern Africa (SADC Region) - Beef and Small Ruminants Value Chains

Although Livestock Production offers the Southern African Development Community (SADC) region an opportunity for accelerated economic growth. However, low productivity, lack of efficient and effective animal disease control, lack of marketing infrastructure, poor market access of livestock products, together with lack of availability of information, and other associated factors hinder the region from achieving its goal of being self-sufficient in livestock products. Institutionally, SADC has a Food, Agriculture and Natural Resources (FANR) directorate that manages several agricultural processes. Notably, these include agricultural production through promotion of irrigation and mechanization development, sustainable use of fertilizers and better seed quality and distribution (including through seed trade); and increased livestock trade (Malabo-Montpellier Panel, 2020). FANR promotes the development of the regional livestock sector through improved animal disease control and health services, and the development and dissemination of a SADC Livestock Information Management System (LIMS).

Under the FARN Directorate, the LIMS was developed as part of the broader Agricultural Information Management System (AIMS) for the SADC region. The SADC AIMS collects, analyses, integrates and disseminates information on crop and livestock production, pests and diseases, climate vulnerability and other socioeconomic variables to enhance policy development, emergency preparedness, and decision-making. One key informant highlighted on-going discussions and activities to integrate the SADC AIMS and the FAO CountrySTAT. The FAO CountrySTAT provides information on production, food security and nutrition, food balances, trade, land inputs and sustainability, population and employment, investment, macro-economic indicators, climate change, forestry and SDG indicators. The SADC LIMS is available at two distinct levels, i.e., Regional Level (SADC) and country level. At regional level, SADC addresses the challenges in this important sector through the Livestock Unit (LU) of the Food, Agriculture and Natural Resource (FANR) Directorate. Currently, the Livestock Unit of the FANR has a regional programme with a number of activities, which include making the LIMS publicly available in SADC Member States. The LIMS was developed as part of the Promotion of Regional Integration (PRINT) Programme and is used to create animal health yearbooks, analyse animal health

data on a monthly basis, development of livestock marketing initiatives and the generation of quarterly trade data (www.sadc.int). The SADC LIMS encompass a wide variety of components, including the following: livestock development; infrastructure; associations and service providers; laws, regulations, acts; animal health; disease occurrence; vaccination; meat inspection; animal production; numbers and composition; production; livestock marketing and trade; products price and import/exports. This regional level LMIS is mostly used by Governments and agribusinesses that import/export live animals for breeding purposes or for meat.

Box 3: The SADC Livestock Information Management System (LIMS)

The SADC LIMS is a decentralized information management system that has a component that collects market information from the lowest level such as the farm and slaughterhouse/abattoir, where a desktop LIMS application is installed. The information is passed upwards until it gets to the regional LIMS. Livestock marketing and trade information is compiled at the SADC LIMS into monthly and quarterly statistical bulletins. Besides the marketing and trade information, the system also encompasses other aspects such as production, animal health and meat inspection data. Key livestock production data is compiled by numbers and composition while livestock products are compiled by number of slaughters (meat), volume of milk produced, and number of eggs. Products from LIMS include yearbooks, bulletins, and a LIMS online portal (<http://gisportal.sadc.int/lims-db/>). The SADC LIMS was developed as part of the donor-funded Promotion of Regional Integration (PRINT) programme. It was used to create animal health yearbooks, analyse monthly animal health data, develop livestock marketing initiatives, and generate quarterly trade data. Of recent, the system has not been operational following the end of the PRINT project.

At country level (member states), there are different LMIS offered by diverse beef and small ruminants value chain players, each suiting its business objectives. In addition, these are mostly shared either by membership (to farmer association members, livestock associations, etc.), or at a nominal fee or entirely for free. In some countries, the government tries to consolidate and or coordinate these different LIMS for the benefit of the livestock farmers. The most distinguishing feature from these LIMS offered at country level and the one offered at regional level is that at country level, current input and output prices are of major importance as they assist farmers in making decisions to sell their animals. At the country level, adequate access to relevant marketing information that is user-friendly and relevant remains a problem, especially for the smallholder livestock farmers. The demand far exceeds the supply and accessibility of reliable and timely livestock marketing statistics by producers remains problematic (Ntshophe, 2011). This challenge limits access to viable livestock markets by smallholder farmers resulting in limited growth and less income realized by these farmers. The red meat industry in SADC needs ready access to up-to-date strategic marketing information, including herd sizes, auction prices, import volumes, slaughter figures, abattoir volumes, contract and average retail cut prices, etc.

4.2 West Africa (ECOWAS Region) – Poultry Value Chain

Since the 1980s, many West African countries have developed and experimented with various AMIS with a view to improving them over time. However, Wane et al. (2016) noted that such numerous AMIS initiatives have failed to result in truly sustainable and socially desirable long-term development of the livestock sector and value chains in the region. As noted by the Malabo-Montpellier Panel (2020), the

main goal of ECOWAS' Strategic Action Plan for Development and Transformation of the Livestock Sector (2011–2020) was 'to accelerate the transformation of the livestock sector in order to achieve food security and increase livelihood benefits.' One key informant highlighted that "In the area of market information systems, ECOWAS established the ECOAGRIS (ECOWAS Agricultural Information System), which is the regional hub for agricultural information and the Cadre Harmonisé, which is a tool to monitor food security at regional and country levels, has been developed, with technical assistance of the CILSS (Comité Inter-états permanent de Lutte contre la Sécheresse au Sahel), whose objective is to better inform decision and policy processes". The ECOAGRIS (<http://www.ecoagris.org/>), which was described by the European Commission as a 'mega information system' (EC, 2012), also encompasses a livestock component, among several other components of agricultural production, marketing and trade. It is one of the most comprehensive MIS on the continent and its secretariat is provided by CILSS in conjunction with WAEMU (West African Economic and Monetary Union). It aims to centralise all rural information for West Africa, including data from LMIS.

The information system (ECOAGRIS) aims to improve the regular generation and dissemination of relevant information on the regional agri-food system in order to facilitate decision-making. Overall, the main purpose of ECOAGRIS is to enable decision-makers in the region to have and use reliable and up-to-date data and information for better formulation and monitoring of agricultural policies. ECOAGRIS also acts as a tool for promoting trade between all actors (public and private) in the REC's agriculture. The System integrates twelve (12) information subsystems of national and regional databases, including the LMIS. The monitoring of agricultural markets is done through National Market Information Systems (NMIS), joint market assessment missions, which are key elements of the regional block's agri-food system. The primary objectives of the NMIS are to:

- Improve the functioning of the market through provision of reliable market information to players, thereby strengthening the bargaining power of producers, broadening consumer choices and ensuring better circulation of products;
- Provide near real time market data (prices, offers, stocks) and information through weekly, monthly, and quarterly market bulletins.

The ECOAGRIS regional database on CILSS markets includes a database on agro-pastoral markets encompassing more than 300 markets distributed in the 17 ECOWAS countries. More than forty products are regularly monitored and grouped together, including cattle, sheep, goats, donkeys, camels, donkeys, horses, and poultry under the livestock component. The emphasis is, however, on crops more than livestock. The regional database on agricultural markets and the agro-pastoral sector seeks to provide stakeholders (market actors, politicians, regional analysts) with the necessary information for promoting trade in the Sahel and ECOWAS regions. Market information is collected and analysed at the level of local aggregation, consolidation, wholesaling, consumer/retail markets, border and cross-border/regional export markets. Besides the numerous crop products, the main animal and livestock products monitored include:

- Live animals: cattle, sheep, goats, camels, donkeys, horses, and poultry
- Meat from cattle, sheep, goats, camels, donkeys, horses, and poultry
- Milk and cheese

- Other products such as honey, milk, eggs, and snails

Box 4: Livestock Market Information System in Mali

Between 2014 and 2019, a Livestock for Growth (L4G) Project was jointly implemented by the government of Mali and the United States Agency for International Development (USAID) through the Feed the Future (FtF) program. It adopted a value chain approach to commercialization of the livestock sector in Mali. The L4G has been mostly implemented by local actors under the supervision of regional authorities. It aimed to strengthen livestock value chain actors' competitiveness, responsiveness to market demands, and access to quality agricultural inputs and services (Malabo Montpellier Panel, 2020). The main objectives of the L4G included enhancing livestock productivity, increasing domestic and regional trade, increasing the entrepreneurial capacity of livestock value chain actors, and strengthening the enabling environment for the livestock sector. It also benefited local institutions through capacity building in market regulations and livestock marketing. The project supported the rehabilitation of the country's LMIS operated by the Observatoire des Marchés Agricoles (OMA). The LMIS for Mali was launched to provide timely, accurate and low-cost relevant market information to various livestock value chain actors. The LMIS is among the five major components of the Mali Livestock and Pastoralist Initiative (MLPI) identified by USAID for Mali. After an initial piloting phase in 1 livestock markets in 2008, the 27 in 2009 and 32 in 2012, the target was to cover 70 markets but the the coup d'Etat of 2012 disrupted the process (Wane et al., 2012). Revitalization of the Malian LMIS emerged in 2014 under the USAID FtF L4G project coordinated by the ILRI. Institutionally, the LMIS is housed under the OMA of the APECAM (Assemblée Permanente des Chambres d'Agriculture du Mali) under the Ministry of Agriculture. Wane et al. (2016) noted that only the OMA and the University of Texas has privileged access to the database, which was supported by data collected from local and regional livestock markets. The OMA provides technical training courses to all enumerators and agents of the various stakeholders.

Data collection involves the observation of protocols and procedures tested and validated by the OMA. Enumerators initially walk around the market conducting their estimates of available stock of dominant species and then use a standard instrument to collect data based on sex, age, and body size and conditions. The enumerators are equipped with motorcycles, mobile phones, GPS gadgets and laptop computers for computing and reporting average market prices of the animals as a first level of data aggregation. The data is then entered into a computer database and transmitted either by mobile phones using the Short Message Service (SMS) or internet to a centralized server at OMA. Once in the sever, the data can be retrieved for compilation, analysis and reporting, ranging from weekly to annual bulletins. Once reported, the data becomes available on the institutional repository and database (www.malibetail.net), making it available for use in conducting price and market analyses. A second level of data aggregation and analysis is performed at OMA to determine any discrepancies which can be resolved at this high level. The processed information is then disseminated via mobile phone SMS or the OMA web interface, which facilitates access to the analyzed market information upon requests and this can be provided in tabular and graphical form. The information is also supplied to local radio stations for dissemination in local languages. Funding for the LMIS activities is provided by the Malian Government and external partners such as ILRI and USAID FtF. In terms of equipment, the LMIS is based on a new generation of data servers located in OMA and DNPIA offices. The major threat to sustainability of the Malian LMIS pertains to political instability and will to fund the initiative beyond the current donor and external project support.

According to Cook (2003), the regional LMIS within West Africa plays an important role in promoting increased livestock trade. Until recently, most MIS in West Africa served mostly governments and donors and, in practice, depended largely on donor funding. Many of such first-generation MIS in West Africa collapsed soon after withdrawal of donor funding. The main NMIS that are currently in existence in the ECOWAS region were developed in the mid-2000s, with the support of the Market Information Systems and Traders Organizations in West Africa (MISTOWA) project. From the MISTOWA project, emerged the RESIMAO, ESOKO and ANOPACI market information systems. RESIMAO is a West-African Market Information Network based in Bamako (Mali), which centralises data from some 400 markets in the region and publishes information for free via internet, SMS and email. ESOKO has emerged as one of the fastest growing and most preferred MIS and business platform for agricultural products, including livestock/meat sectors. The website, www.esoko.com, operates on a paid subscription basis, publishes daily pricing information and business opportunities. More countries continue to join the platform. A recent evaluation of these digital platforms has revealed the following important limitations: (i) limited expertise in new ICT and slow to adapt to technological progress; (ii) shortcomings in the quality of information disseminated; and (iii) limited country coverage and narrow scope and focus on livestock, particularly the poultry value chain (Malabo-Montpellier Panel, 2020).

4.3 East Africa (EAC Region) – Dairy Value Chain

The vast majority of rural people in East Africa depend on income from livestock and livestock products for their livelihoods. Thus, the development of reliable and timely livestock market information systems is vital for informed decision making by the livestock producers and traders when marketing their animals. In the EAC sub-region, establishing an integrated, comprehensive and sustainable LMIS that can easily be accessed by all livestock value chain players has been a challenge. This has been attributed to institutional-, technical and policy-related constraints (Gesare et al., 2017). The situation becomes even more complex when it comes to obtaining sustainable market information from remote and difficult to access arid and semi-arid lands (ASALs), such as in northern Kenya and greater parts of Ethiopia and Somalia, which are predominantly occupied by pastoralists who depend on livestock for their livelihoods. They face a wide array of challenges, including climate-related risks, access to market information and limited opportunities for diversification.

Sources of livestock market information in EAC are governments, producer organizations such as dairy cooperatives and unions, and traders. According to Management Entity (2021), the market information gathered by the cooperatives and unions on prices of dairy and meat, for example, is only shared with their members. The National Livestock Market Information Systems (NLMIS) in respective EAC member states provide regular livestock prices and sales volume information to producers, middlemen, and traders in the main in-country livestock markets. The information from the NLMIS is made readily available to prospective users online or upon requests made via text messaging and email.

Box 5: CLiMIS in South Sudan

South Sudan has a Crop and Livestock Market Information System (CLiMIS) that is involved in the collection, processing and dissemination of agricultural market data. Although the emphasis under the CLiMIS is on crop production and marketing, there is a livestock component (<http://www.climis-southsudan.org/home/livestock>), which seeks to systematically collect and analyze data on Livestock, with support from the FAO. The Market Information Systems network has been existing in the country as an Agriculture and Food Information Systems (AFIS) supported by the FAO. The AFIS is responsible for collection, processing and dissemination of market data. The FAO provides technical support to the AFIS through focal persons attached to the country's Departments of Agriculture who have developed a centralized system for the collation of the market data and provision of real-time analysis of the data. Furthermore, FAO builds the capacity of AFIS personnel and other partners involved in market data collection for the operationalization of the CLiMIS, which is premised on a mobile system for data collection. Capacity strengthening of these relevant government institutions is the major objective of the AFIS, which seeks to improve the quality of information collected and promote its use by decision-makers. This intervention aims to make better livestock data and information available to value chain stakeholders for the development of the livestock sector. The system collects information such as monthly livestock production trends (meat, milk, calving and mortality rates), livestock prices and markets, livestock body condition, pasture conditions, livestock diseases, livestock migration, etc.

With funding support from USAID, the Livestock Information Network and Knowledge System (LINKS) project was initiated in 2003 to provide LMIS in the IGAD region (Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda). Under the Global Livestock Collaborative Research Support Program (GL-CRSP), LINKS developed an ICT system for extending the technical and human capacity in the livestock sector. It aimed to meet the livestock information needs for supporting decision-making by value chain actors in East Africa. Using a partnership approach with existing livestock marketing institutions in the EAC region, LINKS designed and delivered livestock-based ICT platforms that provide market and price monitoring and analysis solutions to foster strategic partnerships between livestock keepers, markets and policy. Autonomous systems with near real-time databases have been established in Kenya (<http://www.lmiske.go.ke/>) Tanzania (<https://asdp.kilimo.go.tz/>) and Ethiopia (<http://www.lmiset.gov.et>). Additionally, given the cross-border nature of livestock trade, the project offers a regional framework where countries involved can collaborate, network and share experiences.

One of the major aims of the LINKS project in the EAC was to promote the application and usefulness of modern ICTs such as mobile phones, Global Positioning System (GPS), Satellite radios, computer-based modelling, and other web-based platforms in improving the LMIS and market information infrastructure. The project was premised on emerging ICT in monitoring livestock marketing, in terms of prices and volumes at various geographic markets and to add value to the LMIS. The integrated use of these tools under the LMIS enables the system to undertake value chain analysis, tracing the source of animals, transportation time and the transaction costs associated with getting them to designated markets. Livestock market monitoring is done by trained enumerators who make use of specially designed data collection tools to gather prices and volumes sold through observation and interviews during the market day. The enumerators make use of mobile phones to submit the collected data to

a central database system. The data is categorized by such variables as animal species, numbers sold, price, breed, and grade of the livestock. The data is coded and submitted to the central database using SMS, e-mail or entered directly into the web portal database. The major limitations of the system relate to its limited scope of focus (does not cover all livestock species) and geographic coverage (limited to country databases). There is great opportunity to develop a regional LMIS from the NLMIS but without external/donor funding support, that might not happen.

Box 6: Livestock Marketing Information System (LMIS) in Somalia

The Somaliland LMIS was initiated in 2007 to address the constraint of high market information costs in Somalia. It collects and disseminates data from three dominant livestock markets and at the seaport of Berbera. With the technical support from Terra Nuova, the LMIS is implemented by the Somalia Chamber of Commerce, Industries and Agriculture, in collaboration with the Ministries of Livestock, Commerce, and Finance, as well as the respective municipalities. The purpose of the Somaliland LMIS is to provide timely and current information to livestock value chain stakeholders for efficient decision making. The envisaged outcomes are (i) reduced transaction costs, increased efficiency and minimized uncertainty in marketing activities; and (ii) minimization of information asymmetry along the value chain.

The data captured in the LMIS are collected twice a week, covering cattle, sheep, goats and camels. In each market, a team of enumerators collects the data and passed on via email or SMS to a Data Management team for entry into a central database hosted by the Chamber. The data are analysed to provide weekly summaries, which are then disseminated to various stakeholders by radio broadcasting, bulk SMS, newspapers, the Chamber of Commerce website, in monthly reports and price brochures (distributed by livestock transporters to farmers along the marketing routes). Annual and termly bulletins are also produced to how trend analysis. At the seaport, data on livestock exports (including vessel name and carrying capacity, number of livestock loaded (disaggregated by species), country of destination and date of shipment) are compiled by the Port Authority and fed into the LMIS.

In the IGAD region, there is the IGAD Centre for Pastoral Areas and Livestock Development (ICPALD), which was established in 2013 as a specialized institution mandated with facilitation of sustainable livestock development. Some IGAD member states, including Djibouti, Ethiopia, and Eritrea went on to adopt national-level livestock development and animal health policies and strategies (Malabo Montpellier Panel, 2020).

4.4 Central Africa (ECCAS Region) – Poultry Eggs Value Chain

The AMIS is not well developed in the Economic Community of Central African States (ECCAS), which commonly known as the Central African region⁴. Individual governments' ministries and departments responsible for agriculture as well as central statistical agencies are the custodians of statistics on agricultural production and marketing. Thus, market information remains fragmented and housed in various institutional setups. This is evidenced by the limited availability of agricultural market information in general and inaccessibility of LMIS in particular. Reputable international development agencies such as FAO and the World Bank have become available sources of market information. The credibility of some of the estimates provided by these institutions has been questioned by some African livestock

⁴ Comprised of Cameroon, DRC, Chad, Gabon, Central African Republic, Burundi, Sao Tome and Principe, Equatorial Guinea, Congo

experts, who think that they could be ‘thump suck’ figures. The experts contend that the reliance of these institutions on data and information from the so-called official sources tend to neglect statistics of transactions that take place in the informal sector. For instance, it is reported that despite being home to 13% of global population, Africa provides only 4% of the world’s poultry products, with the average African reportedly consuming only one egg every 5-6 weeks, unlike the average Japanese person who consumes eggs on a daily basis (World Bank 2019). It is further reported that poultry products are still perceived as luxury in many Central African countries. This is despite the fact that the ECCAS region is one of the leading producers of poultry and poultry products. It is argued that although chicken remains the main source of eggs among all the domesticated poultry species in Africa, there are also other species like the Guinea fowl, turkeys, ducks and geese that constitute a significant proportion in the African poultry, whose statistics are not normally included in the mainstream LMIS. The deficiency in reliable market information is an indication of weak MIS in the region and the need to boost the poultry industry in the region was conceived out of this worrisome reality. For this reason, a Regional Centre of Excellence in Avian Sciences (CERSA) was established in 2014 at the University of Lome in Togo under the World Bank-financed African Centres of Excellence Project. The Centre is working on an initiative to revolutionize the poultry production chain in Central and West Africa. It presents a great opportunity to also revolutionize the poultry-related LMIS. One key informant from the region indicated that “Properly functioning livestock market information systems make it possible to assess the traceability of livestock products, determine the production and consumption trends for livestock products, understand the quality of animals available and flowing through markets in the region, and to take early action for the conservation of endangered species”.

4.5 North Africa (UMA Region)– Buffalo and Camel Dairy Value Chain

The AU sub region of North Africa consists of Egypt, Libya and Sudan and Maghreb countries which are Algeria, Morocco and Tunisia. Dairy production contributes significantly to the livelihood of a large segment of the North African population. According to FAO official estimates for North Africa, dairy production from buffalo, camel, and small ruminants was 5.59 million tons in 2010 but to about 4.74 million tons in 2019. Buffalo⁵ and goat⁶ milk accounts for the largest share (48% and 31% respectively) of total milk production, followed by sheep milk⁷ (19%), and the contribution of camel milk is relatively small (2%), (ILO, 2020). For milk production, reliable accurate statistical data on the total milk production system are not publicly available for camel milk production (Egypt and Tunisia) and buffalo milk production (Algeria, Libya, Morocco, Sudan and Tunisia). Livestock market information in these countries is accessible through responsible government ministries, departments and agencies as indicated in Table 4.

⁵ Buffalo milk production occupies largest share in Egypt

⁶ Goat milk production occupies largest share in Sudan and Algeria

⁷ Sheep milk production occupies largest share in Algeria and Sudan

Table 4: Livestock Production and Related Information Sources in North Africa

Country	Government	Mandate
Algeria	Ministry of Agriculture (MoA) <ul style="list-style-type: none"> National Inter professional Milk Office (ONIL), Algerian Office of Cereals (OAIC) National Agricultural Chambers 	<ul style="list-style-type: none"> organize the dairy sector. One of its main objectives is to significantly increase the rate of raw milk collection. supports large dairy farms, by granting them land for dairy production and production of pasture to move towards fully integrated dairy facilities that produce good quality fresh milk and pastures, as well as milk collection centres. supports fodder production and irrigation to improve breeding performance and production. encourages the creation of small dairy units in the mountainous areas. It also encourages camel and goat breeding in the Saharan areas.
Egypt	Ministry of Agriculture and Land Reclamation (MALR)	<ul style="list-style-type: none"> conducts research work on all areas of food-processing sectors, including dairy products, and the provision of dairy technology research.
Libya	Ministry of Agriculture, Livestock and Fisheries	<ul style="list-style-type: none"> provides agricultural extension services to the farmers. Unsettled situation in Libya undermines extension work.
Morocco	Ministry of Agriculture, Maritime Fisheries, Rural Development and Water and Forests (MAPMDREF, FIMALAIT and MAROC LAIT)	<ul style="list-style-type: none"> provides agricultural extension services to the to all farmers, including dairy producers. Responsible for developing and implementing the Government policy concerning Agriculture and Rural Development Custodian of dairy market information
Sudan	Ministry of Agriculture, Forestry, Cooperatives and Rural Development	<ul style="list-style-type: none"> provides agricultural extension services to the farmers. create an enabling and facilitating environment to rehabilitate, stabilize, and transform South Sudanese agriculture
Tunisia	Ministry of Agriculture <ul style="list-style-type: none"> The Agricultural Extension and Training Agency (AVFA) The Interprofessional Group of Red Meat and Milk (GIVLait) Office of Livestock and Pasture (OEP). 	<ul style="list-style-type: none"> monitors the implementation of programmes pertaining to social and economic development plans, essentially in terms of training and extension. provide a lot of statistical information - overall dairy supply chain every year. provides the development of fodder and pasture resources

Source: Compiled by Author from various sources

North Africa is a net importer of dairy products. Dairy marketing in North Africa can be broadly classified according to three criteria: their industrial capacity (quantity of milk processed yearly), their status (totally private, co-operative, or state-owned) and the type of products they sell (drink milk and/or dairy derivatives). In addition to these industrial processors, there are also numerous artisanal dairy units. In some countries, to note is Algeria, the dairy chains remain embryonic, because of the absence of many industrial processing units. Milk produced by dairy cattle farms outside the oases is sold directly to consumers. By contrast, milk from small ruminants' species (goats and ewes) is consumed on-farm, by the breeders' family members (Benyoucef and Boubekour 2010). However, in some countries like Morocco and Tunisia, the situation is rather different. Milk collection centres play a crucial role within the dairy supply chain. The number of milk collection points has been continuously increasing in both countries as it reached in the year 2011, 230 in Tunisia and more than 1,450 in Morocco. They gather up to 60% of the total output in the two countries. Raw milk collection centres' performances are generally acceptable, as their main function is to gather milk from farmers and to sell it to industrial plants. In Morocco, their gross margins are secure, as there is a differential between farm gate price which is paid to farmers and the price of milk sales to industrial processors. Generally, that differential is up to 5 to 10% of farm-gate milk price, whether farmers deliver by their own means their daily production or the collection centre sends a small pick up to farms to get milk.

5.0 SWOT ANALYSIS OF AFRICAN LIVESTOCK MARKET INFORMATION SYSTEMS

In Africa, the marketing of livestock and livestock products takes place along both formal and informal channels. Live animals and animal products are sold at different ages, weights and volumes under different settings at different places, including farm gates, roadside, village markets, auctions, abattoirs, butcheries and supermarkets, involving a wide range of players along the value chain. There is limited sharing of reliable market information due to weak infrastructure and application of standards, measurements and quality monitoring in predominantly informal markets, a situation that results in the use of rudimentary estimates and marketing livestock ‘by eye’. This renders the collection, dissemination and accessibility of marketing information and intelligence problematic, particularly among rural livestock producers, who end up relying more on ‘word of mouth’ (Malabo-Montpellier Panel, 2020).

Pricing systems for livestock and livestock products have largely lacked transparency, with animal values and prices determined through negotiations at spot markets between the owners of livestock and traders. This situation tends to disadvantage smallholder livestock producers, who often lack bargaining power when engaging with traders, who often have better access to information about market conditions from their relatively organized networks. Thus, the provision of relevant marketing information to all livestock value chain actors enhances transparency and increases market participation by livestock producers and pastoralists. Market information systems that deliver near real-time livestock market information to all value chain players provide an opportunity to “level the playing field” and formalize markets. The increasing penetration of mobile phones and other ICTs in Africa is providing solutions to bridge this information gap and improve decision-making among livestock value chain players.

Presented in Table 5 are results of the SWOT analysis conducted for the LMIS found in five RECs of Africa.

Table 5: SWOT Analysis of LMIS found across RECs in Africa

STRENGTHS	WEAKNESS
<ul style="list-style-type: none"> • Relatively young population across the continent • ICT literate young generation with capability to quickly learn and understand new information • Increasing literacy levels among the African population • Greater participation in livestock value chains by women; they particularly dominate the small livestock value chains, which are resilient to climate change and other shocks • Long history of and greater experience in livestock rearing among pastoralists • Innovativeness and emerging LMIS initiatives by producer organizations 	<ul style="list-style-type: none"> • Lack of clear business models for sustainability of the LMIS • Heavy dependence on donor funding • Low literacy and numeracy levels among livestock producers • Lack of organization and collective action among livestock producers • Limited human resource capacity to effectively operationalize the LMIS in some countries and regions • Fragmented livestock data and information housed in different institutions characterized by duplication and overlaps • Lack of integrated approach to data collection, collation, analysis and dissemination • Biased infrastructure development towards urban areas. Access to technology and information, therefore, favours urban dwellers more than rural populations • Weak linkages between research-extension and livestock producers
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Increasing mobile technology penetration across the continent • The emergency of ICT-based digital e-marketing solutions across Africa coupled with increasing computer literacy • Donor funding for innovative solutions and start-up LMIS • Availability of underutilized LMIS at country and regional levels e.g. the SADC LIMS • Willingness of international development organizations to technically support LMIS development in Africa • Scope for strengthening collaborative ties with or leveraging on existing international organizations' initiatives such as FAOSTAT, World Bank data, LD4D, etc. Scope for integration of additional information beyond market information in emerging digital applications • Coordination role of the AU-IBAR on all livestock-related matters • Strong institutional set-up for sustainable LMIS in the form of ministries responsible for agriculture and livestock • Growing private sector interest in collaborating on LMIS • Strong drive on private sector engagement through PPPs • Good institutional memory with organizations such as ILRI, COMESA, LD4D, etc. • Supporting regional policy frameworks e.g. the COMESA Regional Livestock Policy. • Improving research and extension systems in some regions • Vast knowledge and experience to build on • Postgraduate programmes in livestock offered by the World Bank's CERSA in ECCAS • Abundance of natural resources and favourable climatic conditions for livestock production and development. 	<ul style="list-style-type: none"> • Financial instability that comes with withdrawal of external donor funding • Limited public spending towards the livestock sector and LMIS in particular • Global pandemics such as COVID-19, which disrupt the smooth functioning of markets • High poverty, hunger and low income levels in rural areas and among smallholder livestock producers, which affect the affordability of modern technologies such as smartphones • Climate change, particularly high frequency of droughts coupled with high incidences of animal pests and diseases • Political instability and armed conflicts in some regions • Poor transport and communication infrastructure • Limited energy and power development • High level of informal sector activity (informal marketing of livestock) hampers the collection of accurate data and information • The competitive nature of private agribusinesses may result in reporting of inaccurate market data and information • Too many digital applications and information sources may confuse the end-users and potentially hamper efforts to integrate national or regional LMIS • Generation of inaccurate data based on invalidated information sources may discourage the development of trust towards bona-fide LMIS • Red tape, bureaucracy and corruption in government-affiliated institutions may hamper the smooth development of LMIS • Limited financial literacy and inclusion among poor smallholder livestock producers tend to discourage them from participating in formal market activities.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The review conducted in this study has revealed that most AMIS initiated in Africa have suffered sustainability challenges related to financial instability that comes with ending or withdrawal of external donor funding. The majority of AMIS found on the African continent, including LMIS have generally been supply driven, having been initiated through external funding from donors such as USAID. This heavy dependence for start-up financing from external sources is criticized for being a form of vulnerability that have tended to affect sustainability of the LMIS. For most of the public MIS, there is general lack of clear business models (or income generating policies) to foster financial independence beyond external donor support and this could potentially compromise the future sustainability of the LMIS.

The majority of African livestock farmers are older smallholders living in isolated rural areas and thus lack appropriate access to markets for their products and they are also deprived of agricultural market information. As they lack these, the smallholder livestock producers have no adequate information on demand and supply, what to produce and when, and therefore can be exploited by other actors in the chain and receive low prices for their agricultural produce. This is because the ability of farmers to respond intelligently to the production and dissemination of livestock market information rests on their ability to access and interpret that information in their businesses. The livestock marketing information is not accessible by these resource-poor smallholder livestock farmers in most cases. This usually leaves them with no option but to dispose of their animals at economically unviable prices.

On a practical level, much as the livestock marketing information is in the public domain, the information is fragmented and scattered amongst various sources. There is not one source of livestock market-related information that provides all the information required by all stakeholders. For the decision-maker, it becomes very difficult to consolidate all these pieces of information from a myriad of sources. The real challenge, especially for the benefit of the smallholder farmer is to ensure that all these relevant pieces of information are packaged logically together for optimal use. However, due to the generally low levels of literacy in most African countries and poorly developed infrastructure, technology and communication systems in rural areas, resource-poor livestock farmers find it difficult to access and understand price information. This limits their participation in mainstream marketing activities, particularly so for women.

In some countries, the public sources for livestock market information have become disparate, uncoordinated and largely privatized since the era of market liberalization. A few producer organisations and cooperatives took the initiative to develop commodity-based livestock marketing information systems for the benefit of their membership. The overall intention was to fill in the information gap that was created when state-controlled marketing boards were abolished. However, this implies that

non-members of these producer organizations have no easy access to the information, or they will have to pay more to have access.

The major weakness of all LMIS found across the African continent is that the market information is thinly spread on a number of sources. In some countries, efforts have been made to consolidate all the livestock market-related information into one system to enable users to have access to all relevant information from one source. Information from key informants across the continent revealed that those countries and regions attempting to consolidate the information have been hampered by lack of funding, limited human resource capabilities and inadequate support infrastructure. Countries and RECs that have managed to establish web-based MIS, the information is being complemented by mobile phone technology to enhance dissemination to those stakeholders who may not have access to the internet.

Careful selection and accurate identification of target markets are essential for the development of an effective livestock market information system for livestock value chain players. Out of a few marketing channels available, resource-poor farmers still prefer to market their commodities through informal channels due to the perceived high cost of compliance associated with participation in formal markets. There is therefore a need to provide regular information to this resource-poor livestock producer regarding alternative markets, which may potentially enhance their profitability and welfare.

This study also revealed a lot of important issues still to be addressed by support institutions in their efforts towards enhancing the participation of smallholder livestock producers in mainstream markets. One important observation is that the smallholder sector's inability to meet livestock market requirements is related to their lack of knowledge and information about market requirements. These farmers may have little or no information about price and quality relationships, alternative marketing channels available and various promotional tools that could be used in marketing their livestock.

6.2 Recommendations

The importance of accessing market-related information by stakeholders in the livestock sector of Africa cannot be overemphasized. Partnerships between livestock producer organizations and the commercial sector, relevant government ministries and departments, industry organizations and other relevant parties in generation, dissemination and utilization of relevant market information need to be strengthened within the livestock sector.

Access to good local, regional, and international markets by all actors along the livestock value chain is needed to ensure a thriving livestock sector in Africa that has potential to reduce poverty, enhance food and nutrition security and foster local and regional economic growth. To be able to adequately respond to demand from local and regional markets requires good access to relevant and timely information as well as adequate transport and communication infrastructure and other support services that enable efficient market information sharing and timely delivery of animals and livestock products at the designated markets.

For sustainable development of strong LMIS in countries, across the RECs and on the African continent, there is need to gather, package and disseminate accurate, relevant, useful, timely and affordable market information that benefit all value chain stakeholders. The LMIS need to be complemented by other supportive government programs, policies and investments in infrastructure development, extension services and education. Feedback mechanisms need to be put in place as a mechanism for checks and balances to ensure relevance and usability of the information disseminated to the intended end-users.

Farmer organizations and their commodity associations can play an important role in LMIS by providing reliable and accurate market information to their member livestock producers. The Zambia National Farmers Union is one example of a demand-driven MIS that has potential for scaling (up and out) to other countries and regions of the continent. The LMIS component of the ZNFU AMIS needs to be strengthened to encourage livestock producers to utilize the platform for sharing knowledge and information on all relevant livestock marketing issues and appropriate technologies.

Organization for collective action by livestock producers is important. Livestock producers' associations and cooperatives need to establish strong market linkages between the producers and agribusinesses as well as service delivery institutions. Ultimately, increased access to appropriate market information will enhance transparency and 'level the playing field' to enable livestock producers to make more better-informed decisions regarding when and where to market their animals and animal products.

Stakeholders in the livestock sector, particularly the producers, need to be convinced about the benefits of having a well-functioning LMIS compared to the costs of not having one. Such a cost-benefit analysis can potentially enhance their 'willingness to pay' for reliable market information.

Thus, there is need for deliberate engagement of the private sector and other non-state actors in the LMIS and to foster strong PPPs for the development of clear business models that anchor sustainability of the systems. A balance has, therefore, to be struck between the public interest of achieving social well-being and the commercial (profit-making) interests of the private actors.

The MISs are usually designed and developed with a public goods consideration, which is based on a strong state intervention and public service involvement, thereby making it difficult for the private sector and other non-state actors to identify their role in the system. There is need to engage and foster viable partnerships with mobile network operators and developers of digital applications to take advantage of the rapidly evolving ICT based solutions. The market information services provided should be demand-driven and responsive to the needs of all livestock value chain stakeholders, particularly poor smallholder producers, including women and youth, who are usually marginalized. The market information generated will only be useful if the intended beneficiaries can access and act on it to their advantage.

An integral part of the whole LMIS are enumeration agents, who need to be recruited, trained, managed and paid to a greater extent through the system. In most cases, the enumeration task is delegated to

agricultural extension officers, who are already overloaded with numerous other government errands. There is, therefore, need to have specialized and dedicated enumerators mandated to effectively undertake the enumeration tasks. For sustainable development of LMIS, there is need for these enumerators to be well capacitated and remunerated to ensure that they produce and disseminate accurate, timely and relevant market information.

AU-IBAR needs to coordinate livestock stakeholders in the five RECS to take advantage of evolving ICT-based digital platforms, smartphones and other media to set up robust LMIS as a response mechanism to address existing livestock marketing challenges on the African continent. These challenges can be effectively resolved through availing more reliable market information and making it more readily accessible to all value chain actors in a more transparent manner. The coordination efforts need to ensure that the MIS best practices recommended through the Livestock Data Innovation in Africa project and other similar projects and initiatives across the continent and elsewhere such as the LD4D are adopted, implemented and scaled across all RECs in Africa.

The AU-IBAR should develop a standardized model for the setting up of appropriate LMIS and provide institutional capacity strengthening in national governments and RECs for harmonized implementation of comprehensive LMIS.

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APPENDIX

Appendix 1: Interview Guide for Key Informants

Market Information Systems Audit on the State of Livestock Market Information Systems in Africa

A. INTRODUCTION

Dear Sir/Madam

My name is Kingstone Mujeyi, an independent research consultant with the African Union Inter-African Bureau for Animal Resources (AU-IBAR). The AU-IBAR is a specialized Technical Office of the Department of Agriculture, Rural Development, Blue Economy and Sustainable Environment of the African Union Commission (AUC). Its mandate is to support and coordinate the sustainable development and utilization of animal resources (livestock, fisheries, and wildlife) to enhance nutrition and food security and contribute to the wellbeing and prosperity of the people in the Member States of the African Union (AU). The entity (AU-IBAR) accomplishes this mandate through supporting and empowering the AU Member States, the Regional Economic Communities (RECs), and other stakeholders in the sector. Its vision is that of an African continent in which animal resources contribute significantly to reducing poverty and hunger.

The AU-IBAR is implementing the Sustainable Development of Livestock for Livelihoods in Africa (Live2Africa) Project, which aims to strengthen the systemic capacity of continental, regional, and national livestock sector stakeholders for the economically, environmentally, and socially sustainable transformation of the livestock sector. On behalf of the AU-IBAR, I am conducting a Market Information Systems Audit on the State of Livestock Market Information Systems in Africa. You have been purposively selected to participate in this study. I would like to ask you some few questions concerning the state of livestock market information systems in Africa and suggestions on remedial actions for their utilization in regional livestock value chains. The overall objective of this study is to strengthen the MIS at the regional level to ensure the collection of information necessary for marketing livestock on a continuous and regular basis.

The specific objectives of the assignment are:

- Identify the types of market information systems in various regions that may potentially support livestock market activities;
- Outline observations on the use of identified Livestock related Market Information Systems; and
- Provide high-level recommendations to address identified weaknesses in utilizing existing market information systems for regional livestock market activities

The names of interviewees/organisations were selected based on people's professional position / experience and knowledge. Therefore, you were selected for this particular reason. The data from

this is solely for study purposes and will be treated confidentially and anonymously. The information obtained from this research will be used solely for the MIS audit purposes. Your honest and accurate responses will be greatly appreciated.

SECTION B: ADMINISTRATIV DATA

- a. Date of Interview: _____
- b. Age of Respondent (in years): _____
- c. Sex of Respondent: _____
- d. Type of Organisation: _____
- e. Name of Country: _____
- f. Interviewee designation: _____

SECTION B: IDENTIFICATION THE TYPES OF MARKET INFORMATION SYSTEMS

The following section seeks to collect information pertaining to identification the types of market information systems in various regions that may potentially support livestock market activities.

The questions are as follows:

1. Who are the key value chain actors/stakeholders in terms oflivestock market information service provision (specify the value chain i.e., dairy (cow; camel/buffalo), red meat (cattle and small ruminants), poultry (meat) and poultry (eggs) and probe for both state (RECs, Governments, Ministries, Departments, Parastatals) and non-state actors (Private sector, Farmer Organizations, NGOs, Development Partners/Donors, CSOs, CBOs, etc.)):
 - a. in this country?
 - b. In this region?
2. What are their main roles in the value chain (probe for input, output and service markets provision and facilitation/regulation)?
3. What are the institutional arrangements in terms of livestock market information systems? (probe for various formal and informal channels for gathering, processing/analysis and dissemination of livestock data and information)?

SECTION C: DEMAND AND SUPPLY OF LIVESTOCK MARKET INFORMATION SYSTEMS

4. In your opinion, what is the demand like, for appropriate livestock market information in the region (probe for availability, accessibility, utilization, appropriateness and affordability/cost issues)?
5. What about the supply side, focusing on but not limited to:

- a. Availability of appropriate market information?
- b. Adequacy, and
- c. Quality of market information services provided?
6. What type of market information is gathered, processed and disseminated? (probe for auctions, prices, places, quantity, quality, etc.)
7. The information is provided by who, packaged in what form and how regular is it provided?
8. Who are the providers of livestock market information services (probe for state and non-state actors, including ICT-based platforms)
9. Looking at the current livestock market information systems, what can you say about the following:
 - a. Adequacy?
 - b. Relevance?
 - c. Appropriateness, and
 - d. Effectiveness?
10. On a scale of 1 to 5 (1=unsatisfactory, 2=somewhat satisfactory, 3=satisfactory, 4=fairly satisfactory, and 5=very satisfactory), how would you rank the MIS against these attributes?

SECTION D: IDENTIFICATION OF GAPS IN REGIONAL LIVESTOCK MARKET INFORMATION SYSTEMS

11. What gaps exist between available and needed capacities in regional livestock MIS in terms of:
 - a. infrastructure capabilities, and
 - b. skills and knowledge resources
12. How can these gaps be addressed?
13. What should be the role of the AU-IBAR in addressing these gaps?
14. Can you please comment on the adequacy of funding and budget allocations for livestock market information systems?
15. On a scale of 1 to 5, (1=inadequate, 2=somewhat adequate, 3=adequate, 4=fairly adequate, and 5=very adequate), how would you rank the adequacy of the funding?
16. What is the impact of this kind of funding on the quality of market information services provided?

SECTION E: GAPS, OPPORTUNITIES AND INTERVENTION OPTIONS

17. What policy gaps exist in terms of provision of appropriate livestock market information services?
18. What opportunities are available for enhancing the performance and effectiveness of the market information systems?
19. What should be the future priorities for livestock MIS in this region in terms of information, infrastructure, skills and technology, and related services?
20. What opportunities are there for the AU-IBAR to embark on innovative practices, future strategies, and regional market information intervention?
21. How can these opportunities be maximized for enhanced collaboration and integration of existing market information systems to promote regional livestock value chain interventions?
22. What policy interventions do you recommend for the AU-IBAR to improve the market information systems in the region and the continent?

23. How can the AU-IBAR effectively identify and support new research and innovative opportunities in market information systems development in regional livestock value chains?
24. What collaborative partnerships can AU-IBAR foster for enhanced market information systems development?
25. Are there any general comments you may have on ways for enhancing the performance of the livestock market information systems in this country and region?

SECTION F: CONCLUSION

Sum up the discussion by highlighting the main points raised. Ask if there is anything else that the key informant would like to share. Thank him/her once again for his/her time and information and indicate that the discussion has been very helpful for the study.



African Union – Interafrican Bureau for Animal Resources
(AU-IBAR)

Kenindia Business Park
Museum Hill, Westlands Road
PO Box 30786
00100 Nairobi
Kenya

Tel: +254 (20) 3674 000

Fax: +254 (20) 3674 341 / 3674 342

Email: ibar.office@au-ibar.org

Website: www.au-ibar.org